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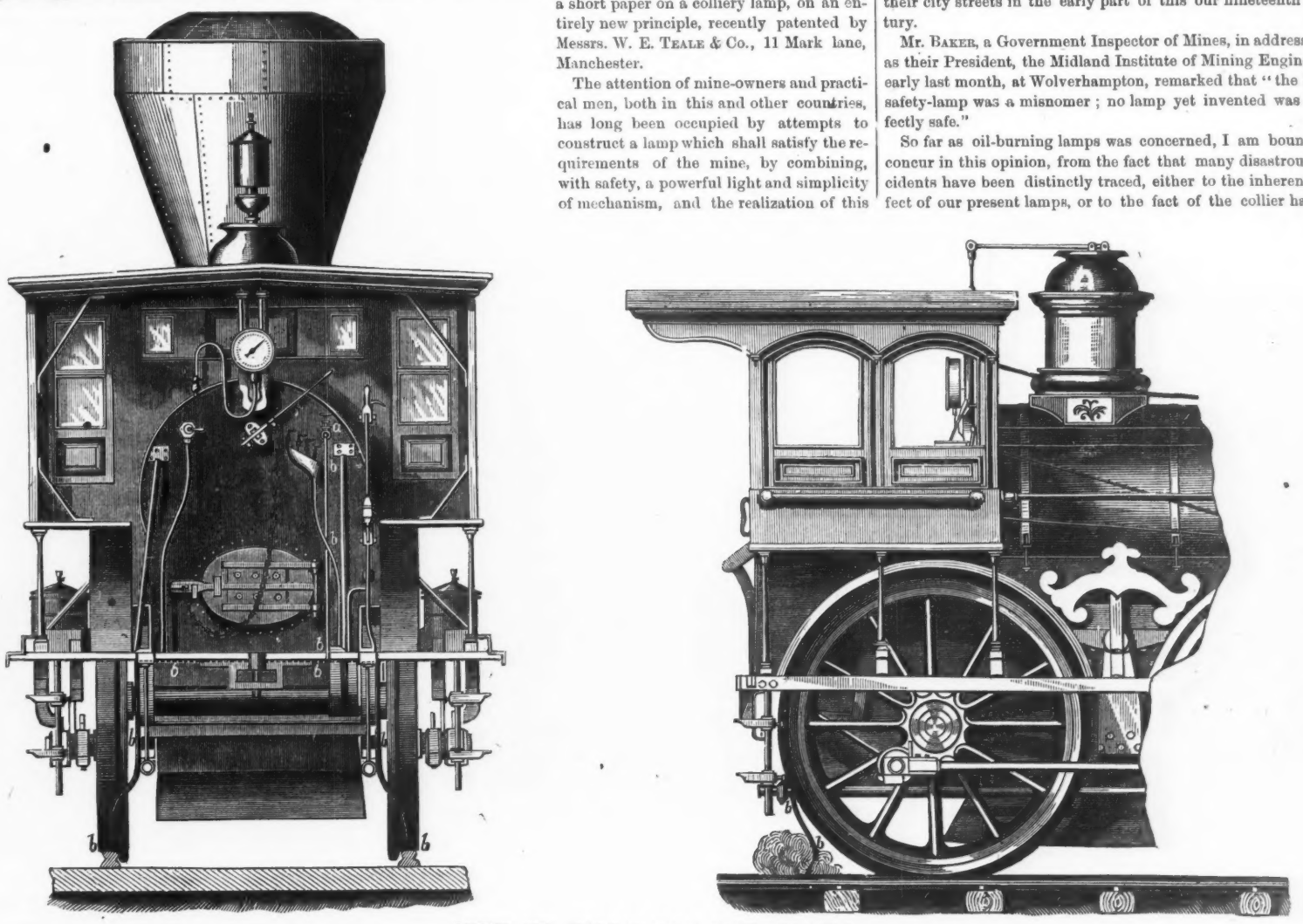
Improved Rail Cleaner.

ALL experienced locomotive engineers are well aware of the immense friction resulting from the use of sand on ascending grades upon a wet, or, in railroad parlance, a dirty rail, sometimes amounting to one-third more resistance than is due to the weight of the train, at the same time causing great destruction to the rails and the wheels of the cars, and also owing to the increased power necessary, a much greater expenditure of fuel.

The use of the Rail Cleaner avoids all those evils by immediately removing the sand behind the wheels of the engine, leaving the rail perfectly clean and moist, whereby the friction of the train is considerably diminished. It has been observed that engines supplied with this auxiliary make their time and



ORTIZ AND VALLADARE'S RAIL-CLEANER.

pull their trains with much greater facility, and the boiler is also kept better and cleaner, as the Rail Cleaner acts as a surface cock on a small scale. Also, on railroads like those in Cuba, where molasses is a great part of the freight, and the surface of the rails is unavoidably covered by the molasses trickling down from the cars, much time was formerly lost in making up the trains at the stations and switches, which is now entirely obviated by the use of the Rail Cleaner, which promptly removes the molasses, and facilitates the placing of the cars in their proper order in the train. Knowing the great benefit which ought to arise from the use of an apparatus that would remove the sand used by the locomotive, for long time past many experiments have been made to construct a Rail Cleaner. Brooms of various classes were tried, but they wore out quickly, and were not effective. To obviate this difficulty, springs were used, but they were not successful. The Rail Cleaner furnished by Messrs. WALTON & CO., No. 56 John street, and here presented in the accompanying engravings at *a*, *b*, *b*, *b*, *b*, effects completely the object for which it is intended, without any of the inconveniences occasioned by any other apparatus in use. This improvement consists in blowing hot steam on the track, immediately after the driving-wheels of the locomotive have passed over it, thus removing the sand which was necessary to prevent the slipping of the driving-wheels. The cost is insignificant compared with the great benefit it produces. It can be put on any locomotive, without affecting any of its pieces; neither is it necessary to change anything. This apparatus is very simple, and owing to its position by the side of the cocks (guage-cocks), is perfectly under the control of the engineer; once placed, it works with the greatest regularity. The discharge orifice being very small—not exceeding one-sixteenth of an inch in diameter—the waste of water is small, and it can be used for a long time without any appreciable lowering of the water level

A New Patent Safety Lamp.*

By W. E. TEALE.

THE importance of any means which can be devised, having for their object the saving of human life, by rendering the occupation of the coal-winner less hazardous, and the interest which the British Association has always felt in any invention conducive thereto, must be my apology for the introduction of a short paper on a colliery lamp, on an entirely new principle, recently patented by Messrs. W. E. TEALE & Co., 11 Mark lane, Manchester.

The attention of mine-owners and practical men, both in this and other countries, has long been occupied by attempts to construct a lamp which shall satisfy the requirements of the mine, by combining, with safety, a powerful light and simplicity of mechanism, and the realization of this want must be of deep interest to all those who are responsible for the safety and welfare of their men, those who have such enormous properties at stake, and to every well-wisher to the brave men who risk their lives in the dark and dangerous mines, on whom we depend for the comforts of the winter hearth, and without whose labors our factories and workshops would be brought to a stand-still, and the noblest navies in the world would ride idly in harbor.

To Sir HUMPHREY DAVY we are indebted for the invention of the lamp which bears his honored name, by means of which thousands of lives have been saved, and in the many modifications and improvements, which have since been made, the fine wire gauze has been necessarily retained, as in the Stevenson (or Geordie), where it forms the entire length of the top, with the glass inside, or partly glass and partly gauze as in the Clanny lamp, in which the glass forms a light chamber below the gauze, both of which, in many respects, show a great improvement on the original Davy lamp; the one much more trustworthy in fiery mines, while the other gives a far better light.

It is admitted that flame may, under certain circumstances, pass the naked gauze, and men are known constantly to light their pipes by drawing the flame through it, which is rendered impossible when glass is also used. Many other patents have been taken out, too numerous to specify, for various improvements in colliery lamps, with the object either of improving the light, of rendering the lock which is generally used in them more secure, or of extinguishing the flame in case the lock should be tampered with, but in all cases, so far as my observation has gone, the old principle of feeding the lamp with oil of various descriptions has been adhered to, consequently smoke and soot are largely produced, clogging the gauze, or glass and gauze, destroying the efficiency of light, and thereby rendering the temptation to the collier to remove the top of the lamp, that he may obtain sufficient light to enable him to work, almost a necessity—so that we seem, as far as our coal mines are concerned, to be indulging still in the glorious brilliancy in which, before the introduction of gas, our grandfathers rejoiced in their city streets in the early part of this our nineteenth century.

Mr. BAKER, a Government Inspector of Mines, in addressing, as their President, the Midland Institute of Mining Engineers, early last month, at Wolverhampton, remarked that "the term safety-lamp was a misnomer; no lamp yet invented was perfectly safe."

So far as oil-burning lamps was concerned, I am bound to concur in this opinion, from the fact that many disastrous accidents have been distinctly traced, either to the inherent defect of our present lamps, or to the fact of the collier having tampered with the top to improve his light. Doubtless many fearful accidents have occurred in which hundreds of lives have been sacrificed, wherein fire and destruction have effectually removed all traces of these fertile sources of danger. I may mention, in passing, the following facts: That when oil is carelessly spilt, left on the outside of the gauze, or when, by overturning the lamp, it may run out of the reservoir inside; coal dust will naturally adhere to the exterior of the oily gauze, and, on the same being overheated by burning gas in the lamp, a sufficient flicker may be produced to fire the mine. The hole through which the pricker works may likewise become so enlarged as to allow a passage of flame with a like result.

To prevent the miner tampering with his lamp, to light his pipe, or, by removing the top, to increase the brilliancy of his light, so as to facilitate his work, a number of patents have been taken out, with the object of extinguishing the flame on his attempting to do so, involving, in most cases, the use of springs, by the action of which an extinguisher is brought to bear on the flame. But a spring is evidently likely to be weakened by use, or to break by becoming rusty in a damp mine, and therefore a poor reliance is to be placed on its certain action at the critical moment, when life and property are at stake. Much, undoubtedly, depends on the attention paid to the thorough ventilation of mines; indeed, some practical men are of opinion that, when it is properly looked to, naked lights may be safely used, but in several fearful accidents which have occurred of late, in pits where good ventilation was a primary care on the part of the managers, a momentary cessation,

* A paper prepared for the Liverpool meeting of the British Association for the Advancement of Science, and "taken as read."

entirely unseen, in connection with insecure lights, has scattered death and destruction to all within reach. Gunpowder —another fertile source of explosion—would be robbed of some of its danger if a really safe lamp were used. With a view to remedy, so far as possible, the dangers arising from the insecurity of the present oil lamps, "The Patent Protector Colliery Lamp," the subject of this paper, has been carefully and thoughtfully designed, to combine safety and brilliancy of light with cleanliness and economy; it is made on the principle of the ordinary sponge or portable gas lamp, in which is used a liquid specially prepared for it by the inventors.

The reservoir or gas-holder is screwed to the top of an ordinary Stevenson or Clanny lamp, within which is fixed a pair of horizontal hinges, moving upwards only. On the wick tube of the lamp, and sliding easily over it, is an outer tube, having round its centre a circular horizontal flange; when the reservoir is screwed upwards into the top, this flange comes in contact with the hinges, raises them in passing, and allows them to fall beneath it when screwed home, so that by reversing the screw, and withdrawing the reservoir gradually from the top the said hinges prevent the return of the said sliding tube, thereby forcing it over the wick tube, and so diminishing, and ultimately extinguishing the light. It is, therefore, impossible for a naked light to become exposed after the lamp has once been adjusted. To render security doubly sure, a lock and stop are so placed that, after the light is put out by the action of the screw, it is still impossible for the collier to withdraw the reservoir from the top so as to relight his lamp. The safety of the mine is further insured by the fact that the gauze is kept perfectly clean, and therefore no dust can adhere to it, as in the old oil lamps. In regulating and reducing the light when testing for gas, which can be done with the greatest ease and certainty, no pricker is used or required, and another source of danger is thereby avoided. This lamp burns freely with less ventilation than any other now in use, and is much more sensitive to the presence or action of gas, while it is impossible for the miner to light his pipe from, or tamper with the light in any way. It gives a much more brilliant light than that produced by the very finest oil, and as neither smoke nor soot is made by combustion, the glass and gauze are as clean, and the light as good at the end of the day as when the miner goes down the pit, and this without the trouble and great loss of time necessary to keep an oil lamp properly trimmed. As compared with oil, the cost of burning "The Patent Protector Colliery Lamp" is ridiculously small, six days, of ten hours each, being obtained at a cost of three pence, or less than one-half the price of ordinary miners' candles, and one-third that of the useful oil.

It has been highly approved by several Government Inspectors, and many practical men, and tested repeatedly in the pits, where it has proved itself a success.

Progress of Biology.

[An address delivered before the British Association for the Advancement of Science.]

By Professor HUXLEY.

[Conclusion.]

So much for the history of the progress of REDI's great doctrine of Biogenesis, which appears to me, with the limitations I have expressed, to be victorious along the whole line at the present day.

As regards the second problem offered to us by REDI, whether xenogenesis obtains side by side with homogenesis; whether, that is, there exist not only the ordinary living things, giving rise to offspring which run through the same cycle as themselves, but also others, producing offspring which are of a totally different character from themselves, the researches of two centuries have led to a different result. That the grubs found in galls are no product of the plants on which the galls grow, but are the result of the introduction of the eggs of insects into the substance of these plants, was made out by VALLISNIERI, REAUMUR, and others, before the end of the first half of the eighteenth century. The tapeworms, bladderworms, and flukes continued to be a stronghold of the advocates of xenogenesis for a much longer period. Indeed, it is only within the last thirty years that the splendid patience of VON SIEBOLD, VON BENEDEN, LEUCKART, KUCHEMEISTER, and other helmintholo-gists, has succeeded in tracing every such parasite, often through the strangest wanderings and metamorphoses, to an egg derived from a parent, actually or potentially like itself; and the tendency of inquiries elsewhere has all been in the same direction. A plant may throw off bulbs, but these, sooner or later, give rise to seeds or spores, which develop into the original form.

A polype may give rise to medusæ, or a pluteus to an echinoderm, but the medusa and the echinoderm give rise to eggs which produce polypes or plutei, and they are therefore only stages in the cycle of life of the species.

But if we turn to pathology it offers us some remarkable approximations to true xenogenesis.

As I have already mentioned, it has been known since the time of VALLISNIERI and of REAUMUR, that galls in plants, and tumors in cattle, are caused by insects, which lay their eggs in those parts of the animal or vegetable frame of which these morbid structures are outgrowths. Again, it is a matter of familiar experience to everybody that mere pressure on the skin will give rise to a corn. Now the gall, the tumor and the corn are parts of the living body, which have become, to a certain degree, independent and distinct organisms. Under the influence of certain external conditions, elements of the body, which should have developed in due subordination to its general plan, set up for themselves and apply the nourishment which they receive to their own purposes.

From such innocent productions as corns and warts, there are all gradations to the serious tumors which, by their mere size and the mechanical obstruction they cause, destroy the organism out of which they are developed; while, finally, in those terrible structures known as cancers, the abnormal growth has acquired powers of reproduction and multiplication, and is only morphologically distinguishable from the parasitic worm, the life of which is either more nor less closely bound up with that of the infested organism.

If there were a kind of diseased structure, the histological elements of which were capable of maintaining a separate and independent existence out of the body, it seems to me that the shadowy boundary between morbid growth and xenogenesis would be effaced. And I am inclined to think that the progress of discovery has almost brought us to this point already. I have been favored by Mr. SIMON with an early copy of the last published of the valuable "Reports on the Public Health," which, in his capacity of their Medical Officer, he annually presents to the Lords of the Privy Council. The appendix to this report contains an introductory essay "On the Intimate Pathology of Contagion," by Dr. BURDON SANDERSON, which is one of the clearest, most comprehensive, and well-reasoned discussions of a great question which has come under my notice for a long time. I refer you to it for details and for the authorities for the statements I am about to make.

You are familiar with what happens in vaccination. A minute cut is made in the skin, and an infinitesimal quantity of vaccine matter is inserted into the wound. Within a certain time, a vesicle appears in the place of the wound, and the fluid which distends this vesicle is vaccine matter, in quantity a hundred or a thousand-fold that which was originally inserted. Now what has taken place in the course of this operation? Has the vaccine matter by its irritative property produced a mere blister, the fluid of which has the same irritative property? Or does the vaccine matter contain living particles, which have grown and multiplied where they have been planted? The observations of M. CHAUVEAU, extended and confirmed by Dr. SANDERSON himself, appear to leave no doubt upon this head. Experiments similar in principle to those of HELMHOLTZ on fermentation and putrefaction, have proved that the active element in the vaccine lymph is non-diffusible, and consists of minute particles exceeding 1-20,000th of an inch in diameter, which are made visible in the lymph by the microscope. Similar experiments have proved that two of the most destructive of epizootic diseases, sheep-pox and glanders, are also dependent for their existence and their propagation upon extremely small living solid particles, to which the title of *microzymes* is applied. An animal suffering under either of these terrible diseases is a source of infection and contagion to others, for precisely the same reason as a tub of fermenting beer is capable of propagating its fermentation by "infection," or "contagion," to fresh wort. In both cases it is the solid living particles which are efficient; the liquid in which they float, and at the expense of which they live, being altogether passive.

Now arises the question, are these microzymes the results of homogenesis or of xenogenesis; are they capable like the torulæ of yeast, of arising only by the development of pre-existing germs; or may they be, like the constituents of a nut-gall, the results of a modification and individualisation of the tissues of the body in which they are found, resulting from the operation of certain conditions? Are they parasites in the zoological sense, or are they merely what VIRCHOW has called "heterologous growths?" It is obvious that this question has the most profound importance, whether we look at it from a practical or from a theoretical point of view. A parasite may be stamped out by destroying its germs, but a pathological product can only be annihilated by removing the conditions which give rise to it.

It appears to me that this great problem will have to be solved for each zymotic disease separately, for analogy cuts two ways. I have dwelt upon the analogy of pathological modification, which is in favor of the xenogenetic origin of microzymes; but I must now speak of the equally strong analogies in favor of the origin of such pestiferous particles by the ordinary process of the generation of like from like.

It is, at present, a well-established fact that certain diseases, both of plants and of animals, which have all the characters of contagious and infectious epidemics, are caused by minute organisms. The smut of wheat is a well-known instance of such a disease, and it cannot be doubted that the grape-disease and the potato-disease fall under the same category. Among animals, insects are wonderfully liable to the ravages of contagious and infectious diseases caused by microscopic *fungi*.

In Autumn, it is not uncommon to see flies, motionless upon a window-pane, with a sort of magic circle, in white, drawn round them. On microscopic examination, the magic circle is found to consist of innumerable spores, which have been thrown off in all directions by a minute fungus called *empusa musae*, the spore-forming filaments of which stand out like a pile of velvet from the body of the fly. These spore-forming filaments are connected with others, which fill the interior of the fly's body like so much fine wool, having eaten away and destroyed the creature's viscera. This is the full-grown condition of the *empusa*. If traced back to its earlier stages, in flies which are still active, and to all appearance healthy, it is found to exist in the form of minute corpuscles which float in the blood of the fly. These multiply and lengthen into filaments, at the expense of the fly's substance; and when they have at last killed the patient, they grow out of its body and give off spores. Healthy flies shut up with diseased ones catch this mortal disease and perish like the others. A most competent observer, M. COHN, who studied the development of the *empusa* in the fly very carefully, was utterly unable to discover in what manner the smallest germs of the *empusa* got into the fly. The spores could not be made to give rise to such germs by cultivation; nor were such germs discoverable in the air, or in the food of the fly. It looked exceedingly like a case of abiogenesis, or, at any rate, of xenogenesis; and it is only quite recently that the real course of events has been made out. It has been ascertained, that when one of the spores falls upon the body of a fly, it begins to germinate and sends out a process which bores its way through the fly's skin; this, having reached the interior cavities of its body, gives off the minute floating corpuscles which are the earliest stages of the *empusa*. The disease is "contagious," because a healthy fly coming in contact with a diseased one, from which the spore-bearing filaments protrude, is pretty sure to carry off a spore or two. It is "infectious," because the spores become scattered about all sorts of matter in the neighborhood of the slain flies.

The silkworm has long been known to be subject to a very fatal contagious and infectious disease called the *muscardine*. AUDOUIN transmitted it by inoculation. This disease is entirely due to the development of a fungus, *Botrytis Bassiana*, in the body of the caterpillar; and its contagiousness and infectiousness are accounted for in the same way as those of the fly-disease. But of late years a still more serious epizootic has appeared among the silkworms; and I may mention a few facts which will give you some conception of the gravity of the injury which it has inflicted on France alone.

The production of silk has been, for centuries, an important branch of industry in Southern France, and in the year 1853 it had attained such a magnitude, that the annual produce of the French sericulture was estimated to amount to a tenth of that of the whole world, and represented a money value of one hundred and seventeen millions of francs, or nearly five millions sterling. What may be the sum which would represent the money-value of all the industries connected with the working up of the raw silk thus produced, is more than I can pretend to estimate. Suffice it to say that the city of Lyons is built upon French silk, as much as Manchester was upon American cotton before the civil war.

Silkworms are liable to many diseases; and, even before 1853, a peculiar epizootic, frequently accompanied by the appearance of dark spots upon the skin (whence the name of "pébrine" which it has received), had been noted for its mortality. But in the years following 1853, this malady broke out with such extreme violence, that, in 1856, the silk-crop was reduced to a third of the amount which it had reached in 1853; and up till within the last year or two, it has never attained half the yield of 1853. This means not only that the great number of people engaged in silk-growing are some thirty millions sterling poorer than they might have been; it means not only that high prices have had to be paid for imported silkworm-eggs, and that, after investing his money in them, in paying for mulberry-leaves and for attendance, the cultivator has constantly seen his silkworms perish and himself plunged in ruin—but it means that the looms of Lyons have lacked employment, and that, for years, enforced idleness and misery have been the portion of a vast population which, in former days, was industrious and well to do.

In 1858, the gravity of the situation caused the French Academy of Sciences to appoint Commissioners, of whom a distinguished naturalist, M. DE QUATREFAGES, was one, to inquire into the nature of this disease, and, if possible, to devise some means of staying the plague. In reading the Report* made by M. DE QUATREFAGES, in 1869, it is exceedingly interesting to observe that his elaborate study of the pébrine, forced the conviction upon his mind that, in its mode of occurrence and propagation, the disease of the silkworm is, in every respect, comparable to the cholera among mankind. But it differs from the cholera, and, so far, is a more formidable disease, in being hereditary, and in being, under some circumstances, contagious as well as infectious.

The Italian naturalist, FILIPPI, discovered in the blood of the silkworms affected by this strange disease, a multitude of cylindrical corpuscles, each about 1-6000th of an inch long. These have been carefully studied by LEBERT, and named by him *panhistophyton*; for the reason that, in subjects in which the disease is strongly developed, the corpuscles swarm in every tissue and organ of the body, and even pass into the undeveloped eggs of the female moth. But, are these corpuscles causes or mere concomitants of the disease? Some naturalists took one view and some another; and it was not until the French Government, alarmed by the continued ravages of the malady, and the inefficiency of the remedies which had been suggested, dispatched M. PASTEUR to study it, that the question received its final settlement; at a great sacrifice, not only of the time and peace of mind of that eminent philosopher, but, I regret to have to add, of his health.

But the sacrifice has not been in vain. It is now certain that this devastating, cholera-like, pébrine is the effect of the growth and multiplication of the *panhistophyton* in the silkworm. It is contagious and infectious because the corpuscles of the *panhistophyton* pass away from the bodies of the diseased caterpillars, directly or indirectly, to the alimentary canal of healthy silkworms in their neighborhood; it is hereditary, because the corpuscles enter into the eggs while they are being formed, and, consequently, are carried within them when they are laid; and for this reason, also, it presents the very singular peculiarity of being inherited only on the mother's side. There is not a single one of all the apparently capricious and unaccountable phenomena presented by the pébrine, but has received its explanation from the fact that the disease is the result of the presence of the microscopic organism, *panhistophyton*.

Such being the facts with respect to the pébrine, what are the indications as to the method of preventing it? It is obvious that this depends upon the way in which the *panhistophyton* is generated. If it may be generated by abiogenesis, or by xenogenesis, within the silkworm or its moth, the extirpation of the disease must depend upon the prevention of the occurrence of the conditions under which this generation takes place. But

* "Etudes sur les Maladies Actuelles des Vers à Soie," p. 53.

if, on the other hand, the *panhistophyton* is an independent organism, which is no more generated by the silkworm than the mistletoe is generated by the oak on the apple-tree on which it grows, though it may need the silkworm for its development, in the same way as the mistletoe needs the tree, then the indications are totally different. The sole thing to be done is to get rid of and keep away the germs of the *panhistophyton*. As might be imagined, from the course of his previous investigations, M. PASTEUR was led to believe that the latter was the right theory; and guided by that theory, he has devised a method of extirpating the disease, which has proved to be completely successful wherever it has been properly carried out.

There can be no reason, then, for doubting that, among insects, contagious and infectious diseases, of great malignity, are caused by minute organisms which are produced from pre-existing germs, or by homogenesis; and there is no reason that I know of for believing that what happens in insects may not take place in the highest animals. Indeed, there is already strong evidence that some diseases of an extremely malignant character to which man is subject, are as much the work of minute organisms as in the pébrine. I refer, for this evidence, to the very striking facts adduced by Professor LISTER in his various well-known publications on the antiseptic method of treatment. It seems to me impossible to rise from the perusal of those publications without a strong conviction that the lamentable mortality which so frequently dogs the footsteps of the most skillful operator, and those deadly consequences of wounds and injuries which seem to haunt the very walls of great hospitals, and are, even now, destroying more men than die of bullet or bayonet, are due to the importation of minute organisms into wounds, and their increase and multiplication; and that the surgeon who saves most lives will be he who best works out the practical consequences of the hypothesis of REDI.

I commenced this address by asking you to follow me in an attempt to trace the path which has been followed by a scientific idea, in its long and slow progress from the position of a probable hypothesis to that of an established law of nature. Our survey has not taken us into very attractive regions; it has lain, chiefly, in a land flowing with the abominable, and peopled with mere grubs and mouldiness. And it may be imagined with what smiles and shrugs practical and serious contemporaries of REDI and SPALEANZANI may have commented on the waste of their high abilities in toiling at the solution of problems which, though curious enough in themselves, could be of no conceivable utility to mankind.

Nevertheless, you will have observed that, before we had travelled very far upon our road, there appeared, on the right hand and on the left, fields laden with a harvest of golden grain, immediately convertible into those things which the most sordidly practical men will admit to have value—namely, money and life.

The direct loss to France by the fébrine in seventeen years cannot be estimated at less than fifty millions sterling; and if we add to this what REDI's idea, in PASTEUR's hands, has done for the wine-grower and for the vinegar-maker, and try to capitalize its value, we shall find that it will go a long way towards repairing the money-losses caused by the frightful and calamitous war of this autumn.

And, as to the equivalent of REDI's thought in life, how can we over-estimate the value of that knowledge of the nature of epidemic and epizootic diseases, and, consequently, of the means of checking or eradicating them, the dawn of which has assuredly commenced?

Looking back no further than ten years, it is possible to select three (1863, 1854, and 1869) in which the total number of deaths from scarlet fever alone amounted to 90,000. That is the return of killed, the maimed and disabled being left out of sight. Why, it is to be hoped that the list of killed in the present bloodiest of wars will not amount to more than this! But the facts which I have placed before you must leave the least sanguine without a doubt that the nature and the causes of this scourge will, one day, be as well understood as those of the pébrine are now; and that the long-suffered massacre of our innocents will come to an end.

And thus mankind will have one more admonition that "the people perish for lack of knowledge;" and that the alleviation of the miseries and the premotion of the welfare of men must be sought, by those who will not lose their pains, in that diligent, patient, loving study of all the multitudinous aspects of nature, the results of which constitute exact knowledge, or science.

It is the justification and the glory of this great meeting that it is gathered together for no other object than the advancement of the moiety of science which deals with these phenomena of nature which we call physical. May its endeavors be crowned with a full measure of success!

The Transmission of Power.

From the Report of Dr. F. A. P. BARNARD, U. S. Commissioner to the Paris Exposition.

[Continuation.]

THE authors of the report, by deferring to the future the more particular study of the influence which the compression of air must have upon the economical value of this mode of transmitting force to distances, have permitted themselves to fall into a serious error. They have failed to detect the fact that the loss is not unimportant, and they have assumed too hastily that the heat taken up by the air in expanding is equal in amount to that which it had emitted while undergoing compression. The difference is very large. To them, and for the purposes which they had in view, it was indeed a matter of no practical importance whether, abstractly considered, the mode was economical or not. The force was needed in the tunnel; compressed air offered the most advantageous expedient for introducing it there, and the water-power required to compress it was withdrawn from no useful purpose, but was running to waste. The question whether or not the fraction of this wasted power which was turned to account was or was not the largest possible, was a question of secondary importance so long as this fraction was adequate to the work to which it was to be applied. It is sufficiently evident, nevertheless, that the compressing engines established at Bardonneche have never produced in practice the quantity of compressed air which was expected from them.

The construction of these compressors is very simple. They operate by applying the living force of a large column of water descending in an inclined tube, to drive a body of confined air into a receiver within which there is maintained a constant pressure of six atmospheres by means of a hydraulic head. Each compressing engine resembles therefore, substantially, a huge inverted siphon, having the long arm inclined and the short arm vertical. The cross-section of this siphon is uniform throughout, except at a point in the long arm near the bend, where there is introduced a valve for the purpose of regulating the periods of motion and rest of the contained water column. At this point the tube is enlarged so as to make the valve opening equal to the full cross-section of the tube, and the valve itself, which is a spindle or puppet valve of peculiar form, somewhat ovoid in shape, or resembling rather a boy's peg-top, drops in opening into a chamber, formed by the enlargement of the tube, of such dimensions that the annular space allowed for the flow of the water around it is still equal to the same cross-section. These precautions are taken to prevent the loss of living force by any change in the velocity of the moving mass.

The short arm of the siphon is the chamber into which is introduced the air to be compressed. At its upper extremity it communicates by a valve with the receiver of compressed air. This valve is kept closed by the pressure of the air in the receiver, so long as the pressure beneath it is less, but when the air beneath attains by compression the same tension as that already in the receiver, the valve opens and the new charge enters.

The compression chamber, or short arm of the siphon, receives its successive charges of air from the atmosphere by valves opening inwards. It is freed from water after each pulsation or act of compression, by means of other valves, which open at a level somewhat above the bend of the siphon, so that the bend itself and the long arm remain always full of water.

The action of the machine will now be easily comprehended. The air chamber being full of air at the ordinary density of the atmosphere, the great valve in the long arm of the siphon is opened, and the water rushes through the short bend into the short arm, compressing the air before it, and finally driving it into the receiver. The water then comes to rest, the large valve of the long arm closes, the discharge valve of the short arm opens, the water escapes and a new charge of air enters.

The difference of level between the head of the driving column of water and the point of discharge is twenty-six metres. The diameter of the tube is sixty centimetres, and the height of the air chamber, measured from the level of discharge at bottom to the valve opening into the recipient at top, is four metres. These measurements would give for the total capacity of the air chamber 1.13 cubic metres; and this is the maximum charge which the machine is capable of compressing at a single impulse. The charge actually compressed, however, is less than this, and is determined by the condition that the resistance which it opposes to the driving force, during its compression and subsequent passage into the recipient, shall exhaust this force exactly, without excess or deficiency. In case the resistance is in excess, a portion of the air will fail to pass into the receiver and so be lost. In case it is in deficiency, a portion of the motive power will be uselessly expended, and, moreover, the column of water will strike the top of the air chamber with violence, and may damage the machine. The practical adjustment of the bulk of the charge to the power of the engine is attained by a tentative process, a series of small valves being adapted to the side of the air chamber in a vertical row, through which the air can escape, but which the air by its inertia closes successively as it rises. If, in a series of experiments, these valves be secured one after another, beginning at the top, the charge of air will be gradually increased, until at length it is found to have the volume required.

There are at Bardonneche ten of these compressors constantly at work, each one making three impulses per minute, or 4,320 per day. If the charge at each impulse were equal to the capacity of the air chamber, the total volume of air compressed daily would be 48,816 cubic metres. It appears that the volume actually compressed amounts to only 23,400 cubic metres, so that the charge in the compressor is but fifty-four hundredths of one cubic metre at each impulse.

If we make a comparison now between the results actually reached and the compressing force employed, we shall see that the loss in practice has proved considerably larger than that which, according to the foregoing statements, theory would indicate. The power of each compression machine is equivalent to that which would be generated by the descent of a vertical column of water twenty-four metres in length and sixty centimetres in diameter through a space of four metres, three times per minute through the day.* The calculation shows that this would a little exceed an eighteen-horse power. The whole ten of the compressors furnish, accordingly, a horse-power of one hundred and eighty.

On supposition that the compression-chambers are entirely filled with air at each impulse, this power will not be equal to the work imposed upon it. But if, instead of 1.13 cubic metres, there be admitted only 0.78 cubic metres at each charge, the total resistance will be exactly equal to the power. Were not heat developed by the compression, the charge might be made as large as 0.94 cubic metres and the total amount of daily compression would be 40,608 cubic metres. It would seem, from the dimensions adopted, as if the original expectation had been to compress one cubic metre at each pulsation of each machine. Had that expectation been realized the compression would have reached to 43,200 cubic metres daily, reduced to 7,200 cubic metres in volume.

The power employed is actually capable of compressing 33,860 cubic metres daily, to a bulk under the pressure of six atmospheres of 9,500 cubic metres, becoming by subsequent contraction 5,700 cubic metres. But the amount actually compressed is only 32,400 cubic metres daily, giving ultimately 3,900 cubic metres of compressed air at the normal temperature. This represents a compressing force of only one hundred and twenty-five horse-power, being less by fifty-five than the theoretic force of the compressors.

The 3,900 cubic metres at the pressure of six atmospheres are capable of producing an amount of work hardly equivalent to seventy-five horse-power. There is therefore a loss at Bardonneche, from causes known and unknown, equal to seven-twelfths of the hydraulic force employed.

It is probable that a part of the loss unaccounted for as above may be a necessary consequence of this mode of applying the *vis viva* of an inert mass in overcoming elasticity. In order to avoid injury to the machine, and also to prevent water from passing along with the air into the recipient, the charge must be large enough. The danger is that it will be made too large, and that a part of the compressed air will fail to enter the recipient. All the force expended upon this portion is thrown away. Another part of the loss may be due to the inertia of a body of water occupying the bend of the siphon, about two cubic metres in bulk, which comes to rest after every pulsation, and opposes the movement of the driving column. The same hydraulic power, or an equivalent steam power, would probably be applied more effectually in compressing air by means of pumps, than in the method above described. This the engineers themselves appear to have tacitly admitted, by introducing pumps at the northern entrance of the tunnel.

It must be finally observed, as having an important bearing upon the question of economy in regard to this mode of transmitting power, that the work which remains stored up in compressed air, after the important deductions we have found it necessary to make, cannot be fully recovered without working the air expansively down to the pressure of the atmosphere. If it has been compressed to six atmospheres, it must be expanded more than three and a half times; if to eight, nearly four and a half; if only to three, to two and a quarter times. At Bardonneche, where the perforators work without expansion altogether, half the power is thrown away.

If we apply the results which we have thus reached to the example above quoted from the report of the engineers of Mont Cenis, we have to make some important modifications of the results there presented. The proposition is to carry to a distance of twenty kilometres, by means of a tube thirty centimetres in diameter, a force represented by an efflux of four hundred and twenty-four cubic decimetres of air per second under a pressure of six atmospheres. It is first necessary to recompute the value of the power which this discharge is capable of affording. The engineers have assumed, what would be true according to the law of Mariotte, viz.: that the pressure of an elastic fluid is inversely as its density, that each litre of the air delivered, as above supposed, would represent a power of work equal to one hundred and ten kilogrammetres. Taking into account, however, the depression of temperature attendant on expansion, this power must be reduced to 61.41 kilogrammetres only. But we must increase this again by the amount of force which the air exerts in being introduced into the working cylinder of the machine which it operates, that is, by the amount of sixty-two kilogrammetres per litre, so that the actual force which litre represents will be carried up to 123.41 kilogrammetres. A supply of four hundred and twenty-four litres per second, with this value, will then furnish a horse-power of six hundred and ninety-eight, say seven hundred, but in order to produce it there will be required an original expenditure of eleven hundred and seventy-five horse-power.

Since, moreover, it appears that the resistances of the tube will call for an increase of the pressure at the source to eight atmospheres, a corresponding addition must be made to this original expenditure. Supposing the volume of air condensed to remain the same, but to be compressed as above required to eight atmospheres, the force necessary for this compression will be no less than one thousand three hundred and fifty horse-power, and the force which the air so compressed would be capable of exerting, if used on the spot, would be only seven hundred and forty horse-power. At the distance of twenty kilometres, it would fall, as above, to seven hundred; so that the loss from all causes would amount to nearly fifty per cent.

It is, therefore, evident that, under the conditions which we have been considering—that is to say, in the use of great pressures and tubes of moderate dimensions, compressed air does not furnish an economical mode of transmitting power. At lower pressures, the original loss is less; and in tubes of larger diameter the resistance in the movement of transmission is less. A tube of fifty centimetres in diameter will deliver the same volume of air at a velocity but little more than two metres per second, and with a resistance of only seven and a half millimetres of barometric pressure per kilometre of distance; which, for twenty kilometres, amounts to one-fifth of an atmosphere. Supposing this air to be originally compressed to three atmospheres, it will deliver a power of two hundred and sixty horse at a distance of twenty kilometres with an expenditure at the

* The column is not vertical but inclined. The mechanical effect, however, (friction being disregarded), is the same as if it were vertical. The length of the inclined column is greater than the vertical difference of level, in the ratio of radius to the cosine of the deviation from the vertical. But as the movement of the water in the tube at each impulse is constantly four metres in the direction of the axis, the descent in the direction of gravity is diminished by the inclination in the same proportion as the length of the column is increased.

source of four hundred horse-power. This will be sixty-five per cent. of the whole. Of the loss, thirty-five per cent. in all, twenty-seven per cent. will be incurred at the point of compression, and eight per cent. in consequence of the resistance of the tube. At the distance of fifty kilometres, or thirty miles, the power delivered will still amount to two hundred and twenty, or fifty-five per cent. of the original expenditure.

It may be interesting to compare this result with that which would be obtained in the application of Mr. HIRN's telodynamic cables to the transmission of a similar power to an equal distance. His allowances for losses are two and a half per cent. of the whole power for the resistances of the two great pulleys at the termini, and eighty-four kilogrammetres per kilometre of distance for the friction of the pulley supports. To these must be added the effect of the resistance of the air and of the rigidity of the cable. On four hundred horse-power the first deduction would be ten. The friction on the pulley supports in fifty kilometres would consume thirty-six horse-power more. For the determination of the resistance of the air to the pulleys the data are imperfect, but an approximate estimate may be formed by considering that the velocity at the circumference of the pulleys is thirty metres per second, and has been carried to forty metres. At thirty metres of velocity the resisting pressure of the air upon a moving body is more than one hundred and twenty kilograms per square metre of surface directly exposed to it. Each pulley has eight spokes, exposing each a surface of three or four one-hundredth parts of a square metre, say one-fourth of a square metre in all. If we take the atmospheric resistance due only to two-thirds of the circumferential velocity, which resistance is fifty-four kilograms per square metre, the force required to overcome it will amount to 13.5 kilogrammetres for each pulley, or to twenty-seven for the pair of pulleys, and to one hundred and eighty-nine—equal to two and a half horse-power—for the seven pairs in a kilometre. Fifty kilometres will, therefore, consume one hundred and twenty-five horse-power, which, added to the consumption above computed for friction, will give a total of one hundred and ninety-one. This being deducted from the entire original force, will leave two hundred and nine horse-power; the resistance due to the lateral friction of the air and to the rigidity of the cable being still to be allowed for. It follows that, for great distances, the transmission of power by compressed air may compete favorably with the only other mode of transmission which could be substituted for it; while, for moderate distances, it is economically inferior. For great distances, whatever mode of transmission may be employed, there must always be a very considerable loss. This will be true even with water, whether conveyed in canals or in tubes; while water-power can only be so conveyed to points at levels lower than the source.

There are parts of our country in which the means of transmitting power to distances are of high importance. In certain portions of our mineral regions the possession of a few hundred horse-power may make to a whole community all the difference between poverty and wealth. If this power can be obtained from the distant mountain torrents by either of the methods which we have been considering, it is certainly better to submit to the loss which they entail than not to obtain it at all. There is an incalculable amount of force constantly wasting itself in the natural world, which never will or can be applied to any useful purpose at the points where it is developed. If the half or the third or the tenth part of such a force can be transported into the heart of an industrial community, the abstract economy of the means of transportation is a matter of secondary importance, provided there are no better means. It may, therefore, be justly concluded that the use of compressed air as a medium for transmitting power, if not theoretically as advantageous as at first thought it might seem, may, under circumstances of not very unfrequent occurrence, be an invaluable expedient for turning to useful account powers which would otherwise be wholly unavailable.

Boring by Machinery.

[From the Colliery Guardian.]

DURING the last few weeks a series of experiments have been conducted in several large collieries, with a view to test the efficiency of the "Villepigue Perforator"—a boring apparatus introduced into this country by Messrs. MACDERMOTT & WILLIAMS, of London. Experimental trials upon hard slates, basalts, and Portland stone, were made some months ago in London, and the results were of a most satisfactory nature. The present trials were undertaken with a view to show that the apparatus was equally adapted to the work of boring required in mining operations. Before recording the results of these experiments, it may not be amiss to give a brief description of the machine and the mode of its operation. The "Villepigue Perforator" consists of an upright hollow standard, or column, fitted at the lower extremity with claws working on a ball and socket joint, and at its upper end having a screw working in the inside of the hollow standard, which screw is terminated by a steel point. This constitutes the stationary or fixed part of the apparatus. A collar is made to slide along the whole length of the standard, and this collar can be clamped at any point of the same. To it there is attached, by a very strong conical joint, a cast-iron box containing the special mechanism for leading out the screw, so as to adapt the latter to the varying hardness of the material to be pierced. Through this box passes the working or main screw, which has a socket at one end to receive the steel auger by which the whole is bored, and at the other a ratchet, or other handle, for turning the screw. If we add to the above enumeration a small lever, or tommy, by means of which every operation required in the adjustment of the apparatus can be performed, we have the whole of the parts composing this very strong, simple, and effective boring machine. Where the hole to be bored is in the heading, the standard to be fixed between the floor and roof, or otherwise between any two bearing surfaces, one or two turns of the top screw—by driving the steel point into the rock, and bringing the claws, at the other extremity, to a solid bearing, no matter what may be the inequality of the surface on which they rest—suffice to render it absolutely fixed and rigid. The sliding collar, being unclamped, is then moved up or down to the position required, and is there clamped; then, by making the box revolve on the conical joint, the auger is adjusted to the angle and point required, the proper pitch is given to the screw by means of the small lever attached to the box, and by turning the handle the boring is proceeded with. If used in open cutting, the apparatus is provided with a frame, in which it is fixed, the other particulars of the operation being as already described.

The apparatus is so portable that one man can easily carry it to his working place, and, arriving there, such is the facility with which it can be worked, that one minute is sufficient to fix it and get it ready for operation. Boring is effected entirely by hand; and although the use of steam, air, etc., is claimed in the patent it is probable that the hand machines are those which will be generally adopted. These are necessarily the least costly, and appear capable of doing all that a boring machine need be required to do.

TRIAL I.—NORMANBY MINES.

NATURE OF MATERIAL.	DIAM.	DEPTH BORED.	TIME.	RATE PER MINUTE.
	Ins.	*ins.*	*min.*	*ins.*
Cleveland ironstone.....	1⅞	18	2	9
Do. do.	1⅞	25	7	3.9

TRIAL II.—CLAY CROSS COLLIERY.

NATURE OF MATERIAL.	DIAM.	DEPTH BORED.	TIME.	RATE PER MINUTE.
	Ins.	*ft. ins.*	*min.*	*ins.*
Tough "blue bind"....	1¼	1 7½	4	4.87
Very hard "stone bind"	1	1 9	3¾	5.60
Very tough coal.....	1½	1 9	2	10.80

TRIAL III.—WHARNCLIFFE SILKSTONE COLLIERIES.

NATURE OF MATERIAL.	DIAM.	DEHTH BORED.	TIME.	RATE PER MINUTE.
	Ins.	*ft. ins.*	*min. sec.*	*ins.*
Hard tough coal.....	2	0 18	1½ 0	12
Do. do.....	2	0 17	3 0	6
Very hard "blue bind".	1	1 11	4 6	6
Do. do.	2	1 9	3 5	4¼
Do. do.	2	3 8	7 11	6¼
Hard Silkstone coal.....	2	1 6	1 20	14
Do. do.....	2	1 9	2 18	9⅜
Do. do.....	2	3 3	3 40	10¼

TRIAL IV.—STAVELEY COMPANY'S COLLIERIES.

NATURE OF MATERIAL.	DIAM.	DEPTH BORED.	TIME.	RATE PER MINUTE.
	Ins.	*ins.*	*min.*	*ins.*
Coal, very tough and hard	1¼	42½	7	6.07
Strong "stone bind," (very hard).....	1¼	22	6½	3½
Strong "stone bind," (very hard)	1¼	34	9½	4½

TRIAL V.—UNSWORTH COLLIERY, NEWCASTLE-ON-TYNE.

NATURE OF MATERIAL.	DIAM.	DEPTH BORED.	TIME.	RATE PER MINUTE.
	Ins.	*ft. ins.*	*min.*	*ins.*
Maudlin coal (very hard)	1¼	3 2	4½	8½
Do. do.....	1¼	1 10	1¼	12½
Maudlin stone top (a hard white shale, with iron nodules)	1½	1 9	1¼	12

OBSERVATIONS.

Trial I.—The stone varies much in hardness. One man will jump a yard in from 40 to 90 minutes.

Trial II.—The first and second trials were made in the roof, at an angle of 45° with the face. To do this work, it take two men nine hours to bore five holes 18 inches deep = 5 inches per hour per man.

Trial III.—Of these trials, the first was made with half sweep of handle; the second with quarter ditto; the three next were vertical borings in the roof with three-quarter sweep; and the last three were bored horizontally with full sweep of handle. Comparative work: One man takes from 20 to 30 minutes in coal to jump a hole 3 feet deep by 1½ inches in diameter, under usual conditions.

Trial IV.—Two men, in stone bind, will drill a 3 feet hole in one and a half hours = 1 foot per man per hour. Perforator, at 3 inches per minute, will do 15 feet; allow 12 minutes, or 3 feet for fixing, etc., = 12 feet per hour, or twelve times what can be done by ordinary hand labor.

Trial V.—The first hole was actually drilled in three minutes and twenty-five seconds—sixty-five seconds having been occupied in changing drills. The last hole was bored in the roof at an angle of 45°.

From the above trials, we obtain the following results:

I. That in the ironstones of the Cleveland district, Yorkshire, a blast hole 1⅞ inches in diameter and 1 yard in depth can be bored by a man using a jumping tool in from 40 to 90 minutes; by a man using the perforator in from 4 to 12 minutes, or from 7 to 10 times as much as ordinary hand labor.

II. That in the work comprised in the second trial, a man using the ordinary jumping tool can only penetrate at the rate of 5 inches per hour; whilst a man using the perforator can bore his hole at the same rate per minute; the immense disparity in this case being due to the fact that the holes were made in the roof, which work the perforator can effect with ease, while a laborer finds the utmost difficulty in making a hole so placed.

III. That in Wharncliffe collieries, near Sheffield, it takes a man from 20 to 30 minutes to jump a hole 1 yard deep and 1½ inches in diameter in the ordinary way, whilst a man using the perforator can drill the same hole in from 3 to 8 minutes; or from 4 to 6 or 7 times the work of ordinary hand labor.

IV. That in this trial, even allowing for the time taken in fixing the apparatus, much longer intervals than occur in practice, a man using the perforator can perform 12 times what he could do using his ordinary jumping tool.

MINING SUMMARY.

Montana.

CABLE CITY.

A correspondent of the *Independent*, Sept. 17, writing from Cable City, says:—"On the Cameron mine work is being carried on day and night. The company is sinking the main shaft, opening up lower levels and taking out quartz. The main shaft is down one hundred and fifty feet. Ninety-three feet from the surface, a tunnel leaves the main shaft for the upper level, a distance of four hundred feet. The ledge at the thickest part is over fifty feet, all of which pays well. The rock is nearly all stoped out in the upper level, and the mill will not be enabled to run regularly before the first of October. The company expect to have the next level of thirty feet ready for stoping by the 25th inst. The main shaft will be sunk until it intersects the ledge, when immense quantities of quartz will be taken out. A good engine for hoisting and pumping is on the ground and works splendidly. A large number of men are employed in the mill, hauling, chopping, etc.

MOOSE CREEK MINES.

The reduction works of Messrs. DAY & HARVEY, situated on Moose creek, near the southern boundary of Deer Lodge county, are now in successful operation. The *Independent*, Sept. 17, says of them: "The works consist of a small furnace, two stamps, a Chili mill and two arastras. The propelling power is a twenty-foot wheel with four-foot breast. The power is ample to run all the machinery at the highest rate of speed. The ore is first roasted, then thrown into the batteries and reduced to pieces about the size of a walnut it is then put in the Chili mill and ground quite fine. From the mill it is introduced into the arastras, where it is run twelve hours, or until it is thoroughly amalgamated. The ore by this process averages $150 per ton. The first class ore of the Day lode, of which there is about one hundred tons on the 'dump,' will probably yield about $225 to the ton. There is also on the 'dump' about fifty tons of second class ore, that will yield about $125 to the ton. They also have a large lot of smelting ore now on the 'dump' which will be sold, if these gentlemen conclude not to build a furnace of sufficient capacity to successfully reduce it in large quantities."

MINES ON ROCK CREEK.

The new mines on Big Rock Creek are represented as paying well. A ditch three and a half miles long has been completed by Messrs. CARPENTER, PICKETT and COGSWELL. They have extensive mines which they are confident will pay about $25 per day to the hand. The gold is of fine quality, being worth about $21 50 per ounce. Other parties are prospecting in the vicinity, and have found encouraging prospects. The new mines are located in Missoula county, a few miles west of the Deer Lodge line, and about fifty miles in a nearly due southwest line from Deer Lodge city.

SPECKLED TROUT MINE.

The *Independent* has the following account of this mine:—"This lode belongs to the Cole Saunders Silver Concentrating Company. We visited the company's mine and reduction works a few days ago. The 'Trout' is a seven-foot lode, crossing the stratas of limestone country rock at right angles. It is developed on the surface a distance of one thousand feet. The upper level, fifty feet below the surface, and in forty-five feet from the main shaft, shows a seven and a half feet lode, and a richer quality of rock than upon the surface. The lower level, eighty-five feet from the surface, shows a better quality of rock than any place above. There is some three hundred tons of ore on the dump, roasted and ready for the furnace. The smelters consist of three furnaces and a cupel furnace, with steam power. The trouble, hitherto, has been the want of galena for fluxing. A small supply was lately procured, and satisfactory tests have been made with a small furnace of one foot interior diameter, and nine feet from the tuyers to discharge hole. The furnace is now running finely, and yielding about one-half ton of metal (worth $700 per ton) every twenty-four hours. On Saturday evening, September 10th, the employees of the mine, members of the company, creditors, etc., met at the office of the company for the purpose of agreeing upon the conditions of a settlement. The meeting organized by electing ADDISON SMITH, Chairman, and ALBERT BROWN, Secretary. After fully discussing the conditions of the proposed settlement, a lease, containing substantially the following conditions, was agreed upon: The Cole Saunders Silver Concentrating Company lease to HENRY SCHNEPEL, as agent of the employees, two of the furnaces and the fifty-foot level of the Trout mine, together with all the ore on the dump. Said SCHNEPEL to furnish two hundred tons of galena for fluxing, and to furnish all supplies until the employees are paid off. Said lease to remain in force until the objects named are accomplished. The Cole Saunders Company retain their lower level and the main shaft, which will be kept running vigorously. They also retain one furnace for their own use and benefit. It is estimated that the Schnepel lease will expire in thirty days after galena ore arrives, judging from the amount of bullion now produced by the one furnace running. Matters are now placed on a permanent basis for regular operations. The capital furnished by Mr. SCHNEPEL will relieve COLE SAUNDERS of his financial embarrassments, and enable him to continue running the one furnace steadily on the company's account. We are pleased to know that the affairs of the company have been so satisfactorily arranged, and that their prospects are so very flattering. COLE SAUNDERS, in building and perfecting these works, has accomplished wonders, considering the obstacles against which he had to contend. Mr. SCHNEPEL, the lessee of the mine and works, is one of the solid men of Deer Lodge county. A careful business man, having gone into this enterprise after analyzing the ores and bullion, and counting the cost, gives further assurance of the entire success of the works."

California.

ALPINE COUNTY.

The *Miner*, Sept. 10th, says that a body of very rich ore has been struck in the lower tunnel of the Tarshish. This soft ore is easily concentrated into "sack sulphurets" worth seventy-five cents per pound. Air Pipe has been put in the No. 3 tunnel of the M. & N. W. Co., and running along the casing commenced. Prospects are favorable.

CALAVERAS COUNTY.

The *Chronicle*, Sept. 17th, says:—PAUL & Co., near the Junction, have struck very rich gravel. A recent clean up, of five days' work, resulted in fifty ounces of dust. The Harkins mine, near Central Hill, the richest in the county, continues to pay as well as formerly. Incline Tunnel is in three hundred and sixty feet, and expects to reach the lead in a few days. In Chili Gulch the hydraulic claim owned by Mr. SHAW is the most notable. Operations are on an extended scale, and the product of gold is large. BRACKETT & Co. are doing well. The gold is principally in cement, extremely hard, which has to be crushed before washing. A battery of five stamps is constanly running. At Sport Hill and Tunnel Ridge, JOHNSON

WOLTERS & Co., BLAKE & Co., MOSER & FIELDS, and others, are employed, with fair results. The Union Shaft boys continue to make the old diggings pay. Corral Flat isn't fairly prospected yet. KELTON'S river claim, at Big Bar, shows $100 per day average yield. In the Buckeye district MARKWOOD & Co., SMITH & Co., and others, are making good wages.

KERN COUNTY.

The Los Angeles *News*, 17th, says of the Joe Walker Mine :—A clean up, after twenty days' run of the mill, was made last week. The result was $7,000 of retorted gold.

LASSEN COUNTY.

The Yreka *Journal*, Sept. 14th, says :—The claim of EHLERS, HASKIN & Co. pays about $250 per day. Dr. MOORE saw them take out $400 in one single day, and as much as $100 to $175 in a single pan of dirt. Owing to the great scarcity of water, it is hard work to mine either with a rocker or any other apparatus, and as for prospecting, it is useless to try it except in winter.

NEVADA CITY.

The Grass Valley *Union* of the 15th says : "The sixth level is 730 feet down, and running in splendid rock. The same drift to the east is also in greatly improved rock. The clean-up of the amalgamators for twelve days, ending Saturday, gave a trifle over $28,000. This includes nothing from the sulphurets."

SAN DIEGO COUNTY.

At the Stonewall Jackson, according to the *Union* of the 15th ult., Capt. FRABY is getting on with the mill, and it will be running in fifteen days. The Company have 100 tons of rock on top of the ground that will pay $30 to the ton.

A. PANLY & Sons have received one hundred and fifty-five ounces of gold bullion from the Julian district during the week.

The San Francisco *Bulletin* has the following intelligence from San Diego, Sept. 22 : "Freights shipped from San Francisco to Arizona City, overland, via San Diego, reached its destination in fifteen days. There are now over three hundred miners at work in the San Rafael valley gold placers. One thousand dollars worth of gold dust from the mines was sold in this place during the past week. At the Julien district the Helvetia mine cleared up one hundred tons, which paid forty-six dollars per ton. The OWENS mine cleared up one hundred tons, paying twenty-eight dollars per ton. The Gilman, a newly-discovered ledge, four tons of the out-croppings paid forty dollars per ton. The Cleopatra, another new ledge, had two tons crushed which went fifteen dollars to the ton. This was not a fair test, however, the richest had not been previously picked out. The stages on the Julien City and Barro mines routes are running full every trip. Great numbers of foot-pads and a few pack-trains are leaving here for the San Rafael valley placers."

Nevada.

WHITE PINE.

The *News*, Sept. 18th, has the following review : "The mills are working steadily, and most of the leading mines are turning out ores of fair quality. Gov. MATTESON is pushing his smelting works towards completion. One furnace has been in blast for a week, and is working admirably. The result of the week's run is about thirty tons of bullion, assaying $180 per ton in silver. For the last two days the work has been gradually increased toward full capacity. The result of the last twenty-four hours' run was 170 bars of bullion, weighing about eight tons—giving an average assay of $186 per ton. The second furnace will be ready to receive ore by Wednesday, and a third the last of the week. South Aurora never looked better. There are eighty men employed. Fifty tons of ore are shipped daily. The last 3,000 tons had an average assay value of $46 per ton. Ward Beecher is still looking well ; fifteen to twenty tons of ore are daily sent to the mill at Swansea. The pulp assays as high as high as $50 per ton, giving an average of $35, O. O. Treasure is still a 'sealed book' to the outside world, all sort of rumors about rich strikes being heard on the street. Silver Wave continues to improve. Fifty tons ore from shaft No. 4 was milled during the week, giving an assay value of $72 per ton. Aurora Consolidated is closed for the present. The English company owning this and the Eberhardt mine have broken at Eberhardt City for the foundation 60-stamp mill. Bullion shipments for six months from WELLS, FARGO & Co.'s office in this city : 789 bars, valued at $1,006,755 26, of which $519,495 47 went West, and $487,259 80 went East. And this is exclusive of base bullion.

"PIOCHE.—ELY & RAYMOND'S mill is turning out plenty of bullion. The new mill is pushed on as fast as possible. The machinery is on the ground. The grading and masonry are complete. So far, the leading mines, the Ely & Raymond, Meadow Valley, and Rutherford & Co.'s, are all turning out good ore in large quantities. A Hamilton telegram of 19th ult. says : Eighteen bars of bullion, valued at $19,142, arrived to-day from the Meadow Valley mines, Pioche City."

Idaho.

The Silver City *Avalanche*, Sept. 24, has the following notes on the mines : "Drifting has commenced in the sixth level of the Ida Ellmore. The Golden Chariot Company has declared a dividend of $2 a share. Mr. SOMMERCAMP, has a shaft down thirty-eight feet on the Red Jacket. Col. HAY, HENRY MARTIN, Esq., and others have their arrastras nearly completed, and are busy at work on the Skookum mine. The Webfoot mill, that was partially torn down for removal to Cope, is being rebuilt for operation here. Large quantities of high-grade ore are being taken from the Chariot mine. Not long since forty-eight tons were taken out in ten hours. DICK ENGLISH and others are said to have made a rich strike on the extension of the Skookum. SANDS & Co. continue taking rich ore from the Illinois Central. CATALOW & BAILEY have hauled their Blue Jacket ore to the Cosmos mill. The BRUCE BROTHERS continue taking good ore from the Crane & Driggs mine. PETE NICK is still busily engaged on the Corduroy contract. Unusual activity in both mining and prospecting prevails throughout our camp."

ALTURAS COUNTY.

We find the following items in a *Statesman* correspondence, dated Rocky Bar, Sept. 8th : "Sheriff CLARK has paid into the County Treasury nearly $3,000 for taxes collected. The delinquent list is less than $400. The Idaho mine is now yielding ore that will pay from $200 to $1,000 per ton, and is being worked in arrastras. The Red Warrior is turning out ore worth from $75 to $200 per ton. Times are getting lively in Alturas."

IDAHO TREASURE.

WELLS, FARGO & Co. received at their Elko office, for the three days ending Saturday, Sept. 14, Idaho treasure to the amount of $42,144.

NEW MINES.

There has been a great stampede from Snake river to the newly-discovered mines, which are said to be about seventy-five miles from Ross's Fork, on the Montana road. The reports are big, and the excitement increasing.

New York.

MINT STATISTICS.

The following is a statement of business at the United States Assay Office at New York for the month ending September 30, 1870 :—

Deposits of gold—	
Foreign coins	$180,000
Foreign bullion	50,000
United States bullion	420,000
Total	$650,000
Deposits of silver, including purchases—	
Foreign coins	$5,000
Foreign bullion	20,000
United States bullion (contained in gold)	5,500
United States bullion (California)	30,000
United States bullion (Colorado)	15,000
United States bullion (Lake Superior)	2,000
United States bullion (Nevada)	38,000
Total	$765,000
Gold bars stamped	$546,415
Silver bars stamped	97,128
Transmitted to the United States Mint, Philadelphia, for coinage	133,000

Africa.

THE SOUTH AFRICA DIAMOND MINES.

A correspondent writes :—There have been large discoveries of diamonds on the banks of the Vaal river. There is great excitement all over South Africa. A provisional government has been appointed, and order is maintained. The diggers will not submit to the Transvaal republic, which claims the territory. The diamond seeking fever is unabated—nay, rather increases as news from the diggings is received from week to week. It would be impossible to enumerate the "parties" who have left for the diamond fields, where a very large concourse of people must now be assembled. As the number of seekers is increased, the extent of the diamondiferous region expands, and it is known that diamonds have been discovered 100 miles apart. Last week intelligence was received that a diamond had been found upon a farm within five miles of Fauresmith. By all the work of excavating and washing the earth is described as very hard work, and the chances of finding diamonds are irregular and uncertain. But most of the parties have found sufficient to remunerate them ; and the best proof that they are satisfied with the results of their labor and their future prospects is to be found in the fact that their friends follow them to the "fields," and all continue to work with hearty goodwill.

ON DIT ABOUT MINES AND METALS.

Action of Sulphuretted Hydrogen.—MAX SCHAFFNER has recently made some observations on the action of sulphuretted hydrogen. When a workman remains for days or weeks in an atmosphere containing a very small quantity of sulphuretted hydrogen, the symptoms are loss of appetite and headache. The sudden respiration of a large quantity of the gas produces immediate insensibility, as if the person had been shot by a bullet ; all the muscles become rigid and motionless ; the eyes are staring, and the lungs give out a rustling sound. Brought into the open air, and the head washed with cold water, the patient revives in a few minutes, and complains of lassitude, but not of any pain. Too long delay in such an atmosphere would be certain death, and probably a painless one. In one instance, a workman who had been rendered insensible by the gas, on his recovery had his combativeness so much aroused that he attacked the bystanders, and was with difficulty kept in bounds. The action of the gas upon the eyes is to inflame them ; they become red and swollen, and finally closed, with severe pain. As a remedy, a wash, composed of one-third of a grain of corrosive sublimate in three ounces of water, is applied. A mixture of air and sulphurretted hydrogen is remarkably explosive. A wire heated red hot, and allowed to lay until its color is dark, is sufficiently hot to occasion the explosion of the mixture. The presence of a small quantity of water vapor will prevent the ignition of the gases. Great care should be observed in factories where sulphuretted hydrogen is likely to be produced, as its action is subtle, and liable to occasion unexpected explosions, as well as loss of life, from its poisonous effects upon the system.

Another Explosive for Mines.—We learn from the London *Mining Journal* that Mr. A. NOBLE, a Parisian engineer, has taken out a patent for improvements in the composition and fabrication of explosive compounds for mines. The following shows the composition of two types of his powder : 1. Sixty-eight parts of pulverized nitrate of barytes ; twelve of charcoal, of light texture ; twenty of nitro-glycerine. 2. Seventy parts of barytes, as above ; ten of powdered rosin ; twenty of nitro-glycerine. The charcoal should be carbonized at a low temperature, and, consequently, still containing hydrogen. An addition of five to eight per cent. of sulphur to either of the above mixtures gives a powder which fires more briskly, but at the same time it increases the danger in the manufacture, carriage, and application of the powder, which should not be lost sight of. The method of using these powders is to place them in cartridges, like firework cases, covering the powder with a little fulminant, such as mercury, for example, before closing and priming. The cartridge has merely to be placed in the hole, and covered in the usual manner, and it may be fired either by a fuse or the electric spark ; in either case the fulminating powder, acting on the nitro-glycerine, inflames the whole of the contents instantaneously. To render carriage of the cartridges less dangerous, a little ordinary gunpowder may be substituted for the mercurial fulminant.

New Rail Works at St. Louis.—The St. Louis *Republican* thus describes the Vulcan Works, now building in that city : "There are to be fifty-four furnaces (heating and puddling) ; three large engines, with fly-wheels weighing 90,000 pounds each, besides six other negines of different sizes, to suit the work performed by each. The rolls are to be twenty-two feet in diameter, which will enable the company to make steel rails when it is advisable. The whole is to have a capacity for turning out one hundred tons of new rails per day, on what is termed a single turn, or about one hundred and seventy-five tons on a double turn (night and day). We expect to see the mill in operation by the first of January next, and giving employment to fully three hundred persons."

The Onondaga (New York) Iron Company have recently erected a new blast furnace, named "Onondaga No. 1." It is sixty feet high, fifteen feet bosh, with bell and hopper, KENT'S patent stove, or hot-blast, and iron stack. The boilers and hot-blast are on the ground. The furnace has been in blast about two months, making No. 1 iron nearly all the time. The product for the week ending August 13 was 218 tons. The materials used are Jefferson county hematite ore, Pittston coal, and Onondaga limestone.

SPECIAL SCIENTIFIC BREVITIES.

How Wounds of the Brain may be Cured.—The *Comptes Rendus* contains an account of experiments and observations, showing that wounds of the brain are usually cured. He cites several instances of human beings who have recovered from injuries involving loss of a portion of their brains, and adverts to his own proceedings in introducing leaden balls into the brains of rabbits and dogs. He made a hole in the skull with a trepan, cut through the *dura mater*, and made a slight incision into the brain itself, in which he placed the ball, which gradually sank into the cereberal substance, making a kind of fistula that cicatrised. If the ball was not too big, the whole thickness of the cerebrum or cerebellum, might be traversed without being accompanied or followed by any bad symptoms or disturbance of functions. He states that, in 1822, he removed one lobe from the brain of various animals, who recovered perfectly, and only lost the sight of the opposite side ; and he adds, "but the most remarkable thing was when I removed the whole cerebrum, or both lobes. The animal deprived of his brain survived more than a year, but he had lost all his senses and intelligence, and was reduced to an automaton. In another instance he took away all the cerebellum, and this creature lived a year. It never regained regularity of movements. It was reduced to the condition of a drunken man.

The Earth's Interior and Crust.—Professor WM. THOMPSON has shown that unless the earth were composed of very rigid materials it would yield under the tide generating forces exerted by the sun and moon, to such an extent as would sensibly diminish the actual phenomena of tides and of precession and mutation. The upper crust of the earth is possibly, on the whole, as rigid as glass—more probably less than more ; but as a whole, the earth must be far more rigid than glass, and probably more so than steel. Hence the interior must, on the whole, be more rigid, probably many times more rigid, than the upper crust. This calculation confirms the views of Mr. HOPKINS, and is quite inconsistent with the hypothesis that the earth is a mass of melted matter enclosed in a thin solid shell. Mr. HOPKINS has shown that this crust cannot be less than 800 miles thick. Professor THOMPSON considers that no thickness less than 2,000 or 2,500 miles would enable it to resist the tide-generating force of the sun and moon so as to leave the phenomena as they are actually found.

Santorin Earth.—The material known as Santorin earth is a native product of the Island of Santorin, situated in the Mediterranean Sea, and part of the Greek territory. This earth, dried at 100°, consists, in 100 parts, of :—*a.* (substances soluble in water)—Sulphate of lime, 00·5 ; chloride of sodium, 0·05. *b.* (soluble in hydrochloric acid)—Alumina, 1·36 ; peroxide of iron, 1·41 ; lime, 0·40 ; magnesia, 0·23 ; silica, 3·40. *c.* (insoluble in hydrochloric acid)—Silica, 66·37 ; alumina, 12·36 ; peroxide of iron, 2·90 ; lime, 2·38 ; magnesia, 1·06 ; potassa, 2·83 ; soda, 4.22 ; water (only eliminable at low red heat), 4·06—Total, 99·83. The substance alluded to is used, along with lime, to form an excellent hydraulic cement ; and the bulk of the contents of this paper are devoted to quote a series of researches bearing upon the subject of the hydraulic cements.

A Reversion Spectroscope.—An important addition to the resources of spectrum analysis has been made by ZOLLNER'S invention of a reversion spectroscope, by which extremely small changes of refrangibility, and consequently comparatively slow motions of a star or sun-flame, can be detected. It consists of a spectroscope, in which, by reflection, the spectrum of a source of light can be superposed above a reversed spectrum of the same source ; so that if a white flame containing sodium be viewed, there will be seen in the upper part of the field a sodium line with the blue end of the spectrum on the one side, and underneath it a sodium line with the red end of the spectrum on the same side. The two bright lines may be made to coincide exactly by an adjustment ; and if any change in refrangibility takes place, the motion of the line is doubled, and is also more exactly measured, because it is referred to itself as a standard.

The Size of Atoms.—Professor THOMPSON has lately been performing a very interesting calculation with a view to determine approximately the size of atoms, the calculation being based upon the phenomenon of capillary attraction, the work performed in overcoming the contractile force of soap bubbles, the kinetic theory of gases (first suggested by BERNOUILLI, and since worked out by HERAPATH, JOULE, CLAUSIUS, and MAXWELL), together with the laws of optical dynamics. As the result of these calculations, he concludes that the diameter of gaseous molecules, or atoms of elementary gases, are not less than 0·0000000907942 of an inch. How much larger than this they may be, he does not tell us in numbers, but he does say that, if a drop of water should be magnified to the size of the earth, and each molecule magnified in the same proportion, the molecules would even then be smaller than cricket balls.

Combustion of Gunpowder in a Vacuum.—M. BIANCHI laid before the French Academy, a few years since, his experiments on the combustion of gunpowder in a vacuum. He found that this substance, and also the fulminates, burnt quickly if loose in an exhausted vessel, and suddenly brought to a temperature exceeding 2000 deg. If, however, the powder was placed under similar circumstances in a pistol, it inflamed with the suddenness exhibited in the air. Gun cotton slowly disappeared, the layer nearest the source of heat going first, but without the production of any light. In all these cases the products of combustion were the same as in air. Combustion also took place in nitrogen, carbonic acid, and other gases which do not support it, and there was little diminution of the ordinary rapidity of the process.

Action of Sunlight on Petroleum.—According to a writer named GRATOWSKI, solar light exercises a remarkable influence on petroleum oils. Exposed to light, he states that the oils absorb oxygen and change it into ozone, without themselves forming any chemical compound with the ozone, which remains at liberty in the oil and oxydizes anything it comes in contact with. The oils, however, are greatly changed when they contain ozone ; they burn with difficulty, it is said, and increase in density. If in corked bottles, the corks decay from the action of the ozone. We do not believe much of the above ; but if it be true, it is quite right of the author to recommend that petroleum should be kept in metallic cans, or, if in glass bottles, be put in the dark.

Power of Electro-Magnets for Lifting Weights.—The author describes a series of experiments, instituted with the view of elucidating the question of the hitherto-conflicting results obtained in reference to the relation the lifting power of an electro-magnet bears to the force of the electric current. The experiments made by the author lead to the result that a retention, or keeping back, of lifting power, after the electric current has ceased to act, does set in with forces of currents which are within the limits of the Lenz-Jacobi's law ; while, on the other hand, a forerunning (Vozeilen) of lifting power is limited to, comparatively, very weak currents.

MARKET REVIEW.

The Coal Trade.

NEW YORK, Oct. 7, 1870.

Matters in the trade are rather quiet, exceptionally so, we should say, were it not for the fact that at this season of the year there is usually a lull just before the opening of the fall business. Last year the dull week came somewhat earlier in the season. People at this time of the year, though they know they must have a stock of coal for the winter, put off buying from day to day, until a cold snap like the present sends them to the coal yards in a hurry. Then, of course, there is a brisk trade, which in a short time reacts upon the general market, and makes things lively. The delays of consumers in supplying themselves act upon the general trade as well, and tend to make things quiet. Now that we have had our first taste of cold weather, we may expect a greater activity in the trade as a result.

On account of the low price of coal, and reasonable rates of freights, we repeat the advice we have given previously to dealers, that is, to buy now, putting in the coal as they can get it, and not be obliged to rush into the market when prices advance and freights are high.

From *Suward's Coal Freight Circular*, to which we wish to give thanks for many favors in the past, we get the following interesting items:

"The proprietors in the Wyoming region are making strong efforts through the aid of Governor Geary to be allowed to work as before with a full force of men until they have the second opening completed. He has been seen on the subject, and says the law did not contemplate that the Inspector should stop them if they were making the second opening. He appeared much surprised when told how hard the law, as now understood by the Inspectors, was working against the proprietors.

"It is rumored that the men in Schuylkill Co. will go out on the basis allowed for September, which is only $2 44½. The men at Nanticoke are on a strike for higher wages. The Pennsylvania Co.'s mines are nearly all idle for want of water.

"From time to time, from almost an immemorable date, the subject of making the piles of coal dirt at the mines available has been advanced; at last it appears to have succeeded, and a company has been organized in Carbon Co. for this purpose, and have sold their entire product to the United States for use in the Navy."

The Shamokin *Herald* says that some dissatisfaction existed among the miners on the first of the month, but at the present writing we believe all the collieries are at work except Trevorton and one or two others.

Messrs. MARTIN, AUCKER and BOWER, of the Shamokin Colliery, are putting up a new breaker, with the capacity of forty cars per day. Mr. DANIEL WEAVER, the veteran breaker builder, is doing the work. The Monitor Colliery, heretofore operated by Messrs. HEIM, BECK & REYER, has been leased to Messrs. GEO. W. JOHNS & BRO., of St. Clair, who are working it. Messrs. BECHTEL, KULP & Co., of the Clinton, have leased the Franklin Colliery. They purpose selling the breaker of the Clinton, and putting the coal mined from the two collieries over the breaker of the Franklin.

Messrs. HAMMETT & NEIL's Circular gives the following report on the trade:

"There is no material change to report in the market this week, the line trade and local demand in this vicinity have continued active, but there is not so much inquiry for shipments from Port Richmond.

"The Committees of the Anthracite Board of Trade and the Workingmen's Benevolent Association met on Tuesday, and having found from the sworn statements presented, that the average price for coal at Port Carbon from the 1st to the 20th of September, was $2 44 1-6, it was agreed that the wages be adjusted on a reduction of 16⅔ per cent. on the $3 basis. In making the average each month the price of Chestnut is always included.

"It has been announced by the Philadelphia and Reading Railroad Company, that on and after to-day, until further notice, there will be paid a drawback on Anthracite Coal shipped from Port Richmond to points south of Cape Henry, east of New Brunswick, and along the line of the Delaware and Raritan Canal, as follows,

On Lump, Steamboat and Broken sizes...60 Cents.
On Chestnut.....40 "
On Egg and Stove.....20 "

This is virtually a reduction in tolls of twenty cents per ton on the first three sizes, and an advance of twenty cents on Egg and Stove.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending October 1, 1870, compared with week ending October 2, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R.	96,856	2,505,335	103,083	2,174,056
Schuylkill Canal	23,007	606,593	27,721	274,215
Lehigh Valley R. R.	23,629	1,662,439	54,559	2,344,626
Lehigh & Sus. R. R.	18,682	576,401	25,914	762,072
Lehigh Canal, south	25,778	582,719	26,592	533,368
Scranton North	16,339	268,220	12,698	569,935
" South	31,017	738,970	32,481	1,311,421
Penn. Coal Co., rail	23,911	733,807	25,098	804,239
" " " canal	716	14,638		13,986
Del. & Hud. Canal Co.	24,749	847,231		1,100,193
" " R.R.	1,158	105,528	13,054	352,245
" " south	8,295	68,787	5,860	343,199
Shamokin	12,670	314,967	17,828	339,449
Trevorton	1,108	23,647	1,695	67,374
Lykens Valley Coal Co.	1,996	54,352	4,551	136,445
Wyoming South	12,080	224,650		231,364
Wyoming North	4,618	45,358		
P. N. Y. C. & R. R. Co.			8,999	231,139
Williamstown, Coal Co.	5,420	151,149	6,400	223,701
Short Mountain	1,292	79,859		
Big Lick Colliery				
Total	333,781	9,806,865	371,638	11,838,018
1869			333,781	9,806,865
Increase week and year			37,857	2,331,353

*Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Oct. 1, 1870, compared with week ending October 2, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	....	748,000	22,552	735,445
C. & O. Canal	....	457 000	14,655	466.665
H. & B. T. R. R.	7,141	267,862	....	568,145
Harrisburg & D.	11,904	....	15,452	583,598
L. V. R. R.	....	552		19,943
P. & N.Y. C. & R. Co.	....	....	6,331	192,802
	19,045	1,483,414	58,990	2,566,598

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, Sept. 29, 1870:

From St. Clair	39,249 12
" Port Carbon	8,015 15
" Pottsville	5,240 06
" Schuylkill Haven	33,306 09
" Auburn	5,934 17
" Port Clinton	15,731 13
" Allentown and Alburtis	104 11
" Harrisburgh and Dauphin	15,452 9
Total paying freight	123,535 19
Coal for Company's use	3,469 10
Total for week	127,005 09
Previously this year	2,665,752 07
Total	2,792,757 16
To same time last year	3,185,957 11

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Thursday, September 29, 1870.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	26,896 05
" Port Clinton	856 00
Total for week	27,721 05
Previously this year	246,494 05
Total	274,215 10
To same time last year	606,543 01

Summit Branch Railroad Company.

The following is the quantity of Coal shipped from Williamstown Colliery, for week ending Saturday, October 1, 1-70 | 6,505 06
Same time last year | 5,420 05
Decrease, Tons | 1,085 01
Total amount shipped to date | 223,701 03
Same time last year | 151,149 19
Increase, Tons | 72,551 04

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending October 1, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct	WEEK, 1869. tons ct	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	24137 15	38832 09	907965 19	597365 09
Upper Lehigh Region	37.8 10	— —	112400 15	77286 03
Mahanoy Region	96 04	95 00	1842 1-	2651 01
Hazleton Region	10210 09	1367 04	232929 08	120 54 11
Beaver Meadow Region	4115 01	777 15	111754 03	9369 11
Mauch Chunk Region	14074 18	16883 19	117.47 17	314139 13
Totals	54362 05	45766 07	1483960 17	1205918 08
Increase	8595 18		278042 09	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	25314 17	18682 02	762072 12	576460 10
Forwarded East of Mch Chunk by Canal	2852 14	25776 00	538358 10	58.719 18
Delivered at and above Mauch Chunk	1011 06	934 16	32436 08	25542 17
Delivered to L. & B. R. R. at Plymouth Bridge	843 08	371 03	151093 07	16044 09
L. V. R. R. at Sugar N.				5151 03
Totals	54362 05	45766 07	1483960 17	1205918 08
Of the above there was transported on acc'nt of L. C. & N. Co.	14950 18	12835 00	142875 13	333689 15
W.-B. C. & I. Co.	15625 07	10922 03	4351-5 18	362416 10
Totals	30579 05	23857 03	573061 11	638106 05
Increase	6922 02			
Decrease			59044 14	

Report of Coal Transported over Lehigh Valley Railroad

For the week ending October 1, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	12,942 19	477,676 10	490,619 09
" Hazleton	44,016 01	1,618,030 19	1,662,049 00
" Upper Lehigh	73 03	11,101 04	11,174 07
" Beaver Meadow	12,851 18	881,479 10	894,331 08
" Mahanoy	9,645 09	206,293 12	215,939 09
" Mauch Chunk	33 07	816 04	849 11
Total Anthracite	79,564 17	2,894,685 19	2,974,250 16
Bituminous Coal recv'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.		10,943 00	10,943 00
P. & N.Y. C. & R.R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	79,564 17	2,905,628 19	2,985,193 16
Same time last year	27,236 07	1,957,029 10	1,984,325 17
Increase	52,269 10	948,600 09	1,050,869 19
Decrease			
Forwarded East from M'h Chunk by rail	54,589 12	2,290,036 10	2,344,626 02
Same time last year	3,629 09	1,639,180 17	1,662,309 17
Increase	50,960 12	650,855 13	681,816 05
Decrease			

RECAPITULATION.

Forwarded East from M'h Chunk by rail	54,589 12	2,290,036 10	2,344 626 02
To N. C. R. R., at Mount Carmel	232 05	2,990 13	3,222 18
Forwarded North from L. & B. Junction	8,999 07	221,635 19	230,635 06
To L. & S. R. R. at Packerton for rail	210 03	6,480 14	6,690 17
Delivered at M'h Chunk	27 06	908 02	935 10
Delivered on line of road above Mauch Chunk	297 14	8,021 00	8,318 14
Delivered above M. Chunk for use of L. V. R. R.	1,170 05	41,659 01	42,829 06
To L. & S. R. R., at P'n Hav., for railroad			
Do. for canal	5,894 01	214,922 01	224,816 02
At M. Chunk for canal	4,144 02	108,031 19	112,176 01
Total Anthracite	79,564 17	2,894,685 19	2,974,250 16
Bituminous Coal		10,943 00	10,943 00
Total all kinds	79,564 17	2,905,628 19	2,985,193 16

Delaware, Lackawanna, and Western Railroad.

COAL Transported for the week ending Saturday, October 1, 1870.

	WEEK. tons. cwt.	YEAR. tons. cwt.
Shipped North	12,688 19	569,938 16
Shipped South	32,431 05	1,311,421 08
Total	45,120 04	1,881,360 04
For the corresponding time last year,		
Shipped North	16,319 06	268,220 17
Shipped South	31,017 13	738,970 12
Total	47,356 19	1,037,191 09
Increase	2,236 15	874,168 15
Decrease		

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, October 1, 1870.

	WEEK.	SEASON.
North	15,298 10	1,640,052 16
South	5,860 12	343,198 17
Total	21,154 02	1,983,251 13
CORRESPONDING TIME IN 1869:		
North	48,783 10	884,521 15
South	8,295 06	67,070 11
Total	56,548 16	951,592 06
Increase North	32,860 00 Inc.	755,531 01
Increase South	2,434 14 Inc.	276,128 06
Total Increase	35,394 14 Inc.	1,031,659 07

The following is a statement of coal transported by the Delaware and Hudson Canal Company, for the week ending October 1, 1870.

	WEEK.	SEASON.
By Del. and Hud. Canal	....	1,100,193 00
By Railroad	13,054 00	352,245 00
South	5,860 00	343,199 00
Total	18,194 00	1,795,637 00
Corresponding time in 1869.		
By Del and Hud. Canal	42,709 00	847,231 00
By Railroad	1,158 00	105,528 00
South	8,295 00	68,787 00
Total	52,162 00	1,021,546 00
Increase	774,091 00	

Pennsylvania Coal Company,

Shipments of Pittston Coal for the week ending Oct. 1, 1870.

	1870. WEEK.	1870. YEAR	1869. WEEK.	1869. YEAR.
By Railway	25,092 14	864 259 05	23,911 10	735,897 01
" Canal		13,916 08	716 05	14,658 01
Total	25,098 14	878,255 13	24,627 15	750,555 02
Increase, 1870, 127,700 11 tons.				

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending Oct. 3, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	8,899 07	222,149 28	231,139 05
Bituminous	6,331 00	186,471 00	192,802 00
Total, Ant. and Bit.	15,330 07	408,610 18	423,941 05

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending Oct. 1, 1870:

	Tons.
For week	15,452 19
Previously this year	568,145 15
Total	583,598 14
Same week last year	11,904 18

Shipments of Cumberland Coal

for the week ending Saturday, October 1, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M	.....	.....	.....
Borden	1,182 09	2,087 15	3,270 04
Consolidation	4,233 07	3,700 14	7,934 01
Spruce Hill	596 07	.....	596 07
Midlothian	448 10	926 11	1,375 01
H. and Baltimore	.....	444 19	444 19
do Va M	501 03	.....	501 03
V C & I Co	1,197 12	.....	1,197 12
G. C. C. and I	707 08	.....	707 08
Maryland	2,724 11	4,161 17	6,886 08
American	1,287 02	3 333 08	4,620 10
Atlantic	1,015 13	.....	1,015 13
Piedmont	1,210 00	.....	1,210 00
Swanton	1,228 14	.....	1,228 14
Barton	972 00	.....	972 00
Potomac	1,394 18	.....	1,394 13
Franklin	1,964 15	.....	1,964 15
Big Vein	1,838 07	.....	1,888,07
Total week	22,552 16	14,655 04	37,208 00
Previous	712 882 06	452,01 0 14	1,164,903 00
Total year	735,445 02	466,665 18	1,202,111 00

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK, October 7. R. A.	W. A.	AT PHILADELPHIA, October 7. R. A.	W. A.
SCHUYLKILL.				
Lump	$— —	$5 00	4 75	4 50
Steamer	— —	5 00	— —	4 50
Broken	— —	5 50	— —	4 50 to 4 75
Egg	5 75 to 6 50	5 50 to 6 00	— —	4 50 to 4 75
Stove	5 75 to 6 50	5 50	6 00	— — 4 50 to 4 75
Chestnut	4 50 to 5 00	6 25	6 75	— — 4 25 to — —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side) cpd	6 10	— —	— —	— —
Broken	5 85	— —	— —	— —
Egg	5 85	— —	— —	— —
Stove	6 10	— —	— —	— —
Chestnut	5 25	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.	6 50	— —	— —
New England	"	— —	— —	— —
Locust Dale	W. A.	6 25	— —	— —
Honey Brook, Le'h	W. A.	4 75 to 5 75	— —	— —
Spring Mountain	"	4 75 to 5 75	— —	— —
Sugar Creek	"	4 75 to 5 75	— —	— —
Sugar Loaf	"	4 75 to 5 75	— —	— —
Old Comp'y's	"	4 75 to 5 75	— —	— —
Cross Creek	"	4 75 to 5 75	— —	— —
Enterprise	"	— —	— —	— —
Girardville	"	— —	— —	4 75
McMichael	"	— —	— —	4 75
Shamokin	"	5 50	6 25	— —
Lykens Valley	"	— —	5 75	— —
Broad Top	"	5 50	— —	— —
Hill & Harris	"	— —	4 75	— —
Henry Clay	"	— —	5 00	— —
Powelton	"	5 50	— —	4 75

[*Dealers in these coals may be found in our advertising columns.]

Prices for Coal at Mauch Chunk.

	F. L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$3 00	$3 75	$3 75	$3 75	$4 00	$3 00
Wilkesbarre	3 00	3 75	3 75	3 75	4 00	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein	f.o.b. at Phila.		$5 00
" " Lemon	"	"	4 75
Cumberland Vein Coal			4 75
Cumberland C. & I. Co.'s on board		N. Y.	7 00
Maryland Coal Co.		"	7 00
Consolidated Coal Co.'s	"	"	7 00

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	4 60	4 75	4 25	5 25	5 75	4 75
Pittston at Newburgh	4 85	4 90	5 10	5 25	5 50	4 50
Lackawana at Rondout	4 90	5 00	5 05	5 10	5 50	4 65
Wilk'b're at Hoboken	4 50	4 50	5 25	5 25	5 75	4 50
Old Co. Lehigh at Pt. Johnston	5 50	5 40	5 40	5 60	5 75	4 00
Lehigh at E. Port	5 25	— —	5 25	5 50	5 75	4 50

For freights to different points, see "Freights."

Prices at Baltimore—October, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 80@— —
Pittston and Plymouth, do	5 65@5 75
Shamokin Red or White Ash, do	— —@6 00
Lykens Valley Red Ash, do	6 25@— —
Zerba Valley	5 25@— —
Treverton	6 00@— —
By retail, all kinds per ton of 2240 lbs.	7 25@8 25
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 80@4 75
Fairmont and Clarksburg gas, f. o. b. at L. Point	6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

October, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 55

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@5 50
Lykens Valley	— —@6 25
Shamokin Red or White Ash	— —@5 75
Trevorton and Zerba Valley	— —@6 00

Prices of Gas Coals.

October, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 73 Pine st., N.Y.
Duty, $1 25, gold.

	Coarse.	Slack.
Block House	$1 75	@- 75
Gowrie	1 75	@- 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@- 80
Lingan	1 75	@- 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Coarse. currency.	Slack
Fairmount Gas Coal Co. of N. Y.	7 50	@- —
Despard Coal Co	$7 50	@- —
Penn	— —	@- —
Newburg Orrel Gas	— —	@- —
West Fairmount Gas Coal	8 00	@- —

AT PHILADELPHIA.

Powelton.....$7 80

Prices of Foreign Coals.

October, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	11 00@12 00
" House	15 00@16 00
" Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel, "	18 00@20 00

Fer ton 2,000 lbs. delivered

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon	$2 00
Less drawback of 80 cents on all Coal shipped east of New Brunswick and south of Cape Henry.	

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 81
C. R. R., N. J., Easton to Elizabethport	1 25
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 41

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 81
C. R. R., of N. J., Easton to Pt. Johnson	1 29
Shipping expenses	25
Warfage	10
Total	$2 45

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 81
Morris & Essex R. R. Easton to Hoboken	1 29
Shipping expenses	25
Warfage	10
Total	$2 45

TO SOUTH AMBOY.

L. V. R. R.	81
B. & D. R. R. / Cam. & Am. R. R.	1 09
Shipping Expenses	25
Total	$2 15

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	84
C. RR. of N. J. Easton to Elizabethport	1 27
Shipping expenses	25
Wharfage	10
Total	$2 46

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven	$1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris " / Freight, Towing	1 10
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris " / Freight	2 00
	2 40
For re-shipment	2 20
Total	$4 60

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25
Towage	20
Total	$ 2,50

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	1,03
Freight	35
Total	$ 2,10

For Re-shipment—30 extra for shipping, and 10 cents. drawback.

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40
	Per Boat.
Greenwich	$70 00
Port Chester	80 00
Mamaroneck	70 00
Glen Cove	60 00
New Rochelle	55 00
East Chester	60 00
West Chester	30 00
White Stone	30 00
College Point	25 00
West Farms	25 00
Flushing	30 00
Harlem and Mott Haven	20 00
Port Morris	20 00
Ninety-first street and Astoria	16 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS

Boats of 150—250 Tons.	Per Ton.
To Manhattanville	8 cents
Spuyten Duyvil	8 "
Yonkers	9 "
Hastings	10 "
Piermont	12 "
Dobbs' Ferry	12 "
Nyack	—@6 00
Tarrytown	15 "
Sing Sing	16 "
Croton Landing	17 "
Haverstraw	17 "
Verplanck's	17 "
Peekskill	18 "
West Point	20 "
Cold Spring	20 "
Newburgh	18 "
Poughkeepsie	22 "
Rondout	23 "
Boats of 100 Tons	Per Ton
To Manhattanville, and Return	$11 00
Spuyten Duyvil	13 00
Yonkers	15 00
Sing Sing	20 00
Peekskill	25 00

Freights.—OCTOBER, 1870.

TO EASTERN PORTS.	From Philadelp'a.	From E. Port and Port Johnston.	From Newburg....	From Rondout....
Amesbury	$2 50	$2 15	$ —	$ —
Bangor	2 25	1 90	1 60	
Bath	2 25	2 00	— —	
Boston	2 35	1 90	2 25	1 90
Bridgeport	1 75	1 00	1 10	1 20
Bristol	2 00	1 40	1 40	
Cambridgeport	2 35	1 40		
Derby	2 00	1 20		
Dighton	2 30	— —	1 45	
East Cambridge	2 35	2 30		
Fall River	2 50	1 40	1 40	
Hackensack	1 75	1 50		
Hartford	2 50	1 35		
Jersey City	1 35	60		
Middletown	2 25	1 25		
Mystic	— —	1 25	1 30	
New Bedford	2 00	1 40		
Newburyport	2 50	2 10		
New Haven	1 90	1 00	1 10	1 20
New London	2 00	1 20	1 25	1 30
Newport	2 00	1 40	1 40	
New York	1 35	1 60	70	
Norwalk	1 80	1 00	1 05	
Norwich	2 00	1 25	1 35	1 40
Pawtucket	2 25	1 50	1 60	
Portland	2 25	1 75		
Portsmouth, N. H	2 25	2 10		1 85
Providence	2 00	1 40	1 45	1 45
Rockport	2 10	— —		
Saco	2 25	2 10		
Sag Harbor	1 70	1 40	1 30	2 35
Salem	2 25	1 90	2 25	
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 30	2 00		
Warren	— —	1 40	1 45	
Washington	1 25			
TO RIVER PORTS.				
Albany		90	— 60	
Catskill		— —	— 50	
Cocksackie		— —	— 50	
Coeyman's		— —	— 75	
Cold Spring		— —	— 35	
Fishkill		— —	— 30	
Haverstraw		50	— 60	
Hudson		— —	— 50	
New York		— —	— 70	
Nyack		60	— 60	
Poughkeepsie		— —	— 35	
Rhinebeck		— —	— 30	
Rondout		— —	— —	
Saugerties		— —	— 40	
Sing Sing		— —	— 75	
Stuyvesant		— —	— 55	
Tarrytown		80	— 75	
Troy		90	— 75	
West Point		— —	— 35	
Yonkers		40	— 60	

Foreign and Provincial Freights.

October, 1870.

Foreign.	
Newcastle and Ports on Tyne, per keel of 21 1-5 tons	£14 00@£16 00
Liverpool, 5 per cent primage	13s. @16. ton
TO NEW YORK.	
Provincial	
Sidney	$—
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—
TO BOSTON.	
Sydney	$—
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—

METALS.

NEW YORK, October 8, 1870.

IRON.—Duty: Bars, 1 to 1¼ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1¼ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, 9 ℔ ton; Polished Sheet, 3 cents ℔ lb.

	Store Prices.
Pig, Scotch No. 1, ℔ ton	33 00@37 00
Pig, American, No. 1	33 00@— —
Pig, American, No. 2	31 00@32 00
Pig, American, Forge	27 00@29 00
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00
	Store Prices, Cash
Bar, Swedes, ord'y sizes, less 5 ℔ ct	— —@110 00
Bar, Refined, " "	80 —@ 85 00
Bar, Common " "	75 00@ 80 00
Scroll " "	97 50@130 —
Ovals and half-round " "	100 —@125 —
Band " "	95 —@ — —
Horse Shoe " "	95 —@ — —
Rods, ⅝ to 3-16 inch " "	95 —@120 —
Hoop " "	105 —@150 —
Nail rod, less 5 ℔ ct	— 7@— 7½
Sheet, Russia, as to Nos. (gold)	10¾@—11¾
Sheet, Single, D. and T. Common	— 5@— 6
Sheet, Galv'd, Nos. 14 to 26 10 and 12c. Nos. 27, 28, and 29, 13@14	
Rails, English (gold), ℔ ton	57 00 @60 00
Rails, American, at Works in Pa	70 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents; over 11 cents, 2½ cents ℔ lb, and 10 ℔ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ℔ lb	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11½@— 14
English German (2d and 1st quality)	— 13 @— 15
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— — @— 12
American, Spring, do.	— 9 @— 11
American Machinery, do.	— — @— 12
American German, do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 30
Copper Bolts	— @— 30
Copper Braziers, 16oz. and over	— @— 30
Copper Nails	35 @— 36
Copper, Old Sheathing, &c., clean	— @— 19
Copper, Chili Pig	— @— —
Copper, American Ingot	@— 21½
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb; Pipe and Sheet, 2¼ cents ℔ lb.

Galena, ℔ 100 lbs	$— @— —
Spanish (gold)	6 25 @6 35
German, do.	6 25 @6 37
English, do.	6 37½@6 62½
Bar (net)	7 75 @8 00½
Pipe (net)	7 75 @— —
Sheet	8 00 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent. ad val.

	Gold ℔ lb.
Banca	36¼@36¾
Straits	33¾@34
English	32 @32½

PLATES.

Fair to Good Brands.	*Gold.*	*Currency.*
I. C. Charcoal, ℔ box	$8 50 @8 87½	$10 25 @10 75
I. C. Coke	7 25 @8 —	8 50 @ 9 00
Coke Terne	5 87½@6 75	7 00 @ 8 50
Charcoal Terne	7 62½@8 —	9 00 @ 9 50

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ℔ 100 lb

	Gold.
Plates, Foreign, ℔ 100 lbs.	$— @ 6 37½
Plates, Domestic, ℔ lb.	06½@— 11½

REMARKS:

IRON.—There has been an improved demand for Scotch Pig, but the light supply restricts business, and prices are very firm; 500 tons Glengarnock, in lots, sold at $33 50, and 250 do., to arrive, $33. American meets with very little inquiry, and prices have a downward tendency. Wrought Scrap continues in demand, and we notice sales of 310 tons, part from yard, on private terms. New Rails have been in improved request, and sales have been made of 2,000 tons 60 lb. English at $57 75 gold; 2,000 do. American, at the works, on private terms; and 500 do. old Double Headed, $40 gold. Bar from store continues very quiet, and rather nominal at $80 @ $85 (the latter for ¾ inch), and from makers' hands in Philadelphia $80 @ $82 50 per ton is asked. Bar is sold on a very small margin on cost of importation, and sometimes without any margin. Plow sizes Swedes Bar, recently very scarce, are now in full assortment. Sheet of all kinds is dull at our quotations.

TIN.—The market for Pig remains very dull and is rather unsettled, dealers having supplied themselves by free purchases some time ago to arrive (the parcels now at hand) are not buying, and hence the stagnation. We quote nominally Straits 34½ @ 34¾ cents for small parcels, and 33¾ @ 34 for large lots, Banca 36½ @ 36¾, and English 32 @ 32½ all gold. Plates are also quite dull, the volume of business so far this season not meeting the expectation of holders; stocks, though not burdensome, are ample for the present demand prices generally are rather in buyers' favor. We have only to notice sales of 250 boxes Charcoal Tin at $8 62½ for I. C.; 100 do. within our range; and 250 do. Charcoal Terne, $7 75 @ $7 87½ gold. The stock of Pig in first and speculative hands at this port and Boston, 1st inst., was 2,200 slabs same time, 1869, 10,000; 1868, 12,250; and in 1867, 18,900.

COPPER.—The manufactures of Copper and Yellow Metal are steady at our quotations. The offerings of Ingot are moderate, and, with a fair demand for consumption, and some speculative feeling, prices are steady and firm; sales have been made of 2 @ 300,000 lb. at 21¼ cents for Lake, and 21⅜ cents for Baltimore, cash, and deliverable all this month; and 25,000 lb. Lake, deliverable in thirty days, 21⅜ cents.

LEAD.—Foreign Pig is very quiet, and we hear of none but jobbing sales; ordinary may be quoted at $6 25 @ $6 37½, and reduced $6 40 @ $6 50, gold. Bar is reduced to 7¼ @ 8 cents, Pipe to 7½ and Sheet to 8 cents—all net cash.

SPELTER.—The market remains dull, and we hear of no sales. We quote nominally Silesian, Stolberg and V. M., $6 25 @ $6 37½, gold.

STEEL—Continues steady at old rates for lots from store.

ZINC.—Am. Oxide, 6 6½; French do., 11 @ 11½; Sheet do., 9¼ @ 10.

MANGANESE—4 @ 4½ cents.

Mining Stocks.

NEW YORK, Oct. 7, 1870.

We note a slight improvement in the prices for gold mining stocks. Consolidated Gregory is now quoted at 75 @ 80c.; Grass Valley, 29 @ 38c.; Central Gold, 17 @ 19c.; Black Hawk, 32 @ 35c.; Benton, 3c.; La Crosse, 8c.; N. Y. and Eldorado, 20 @ 50c.; Quartz Hill, 20c.; Symonds' Fall, 50c.; Benton, 50c., and Manhattan Silver, 50 @ 75c.

Calumet copper is quoted at 70c.; Wallkill lead, 3c.; Assorted, 5c.; Lehigh and Susquehannah coal, $1 10.

Petroleum stocks are somewhat stronger, as shown by the following comparative table:

	Sept. 28. *Bid.*	*Asked.*	Oct. 7. *Bid.*	*Asked.*
Bennehoff	20	—	22	—
Bergen Coal and Oil	20	—	—	40
Blood Farm	—	—	—	—
Brevoort	—	50	50	—
Buchanan Farm	—	47	—	45
Central	—	60	55	65
Home Petroleum	1	40	1 50	—
N. Y. and Alleghany	—	—	1 50	—
National	—	—	—	—
Northern Light	—	—	—	75
Phillips' Pet	25	—	15	—
Pithole Creek	1 20	—	—	1 25
Rathbone	—	40	—	40
Rynd Farm	28	—	28	—
Second National	—	—	—	—
United Petroleum Farms	16	19	15	20
United States	—	75	60	75

San Francisco Stock Market.

A telegraphic report from San Francisco, dated October 6, quotes Comstock stocks at advanced prices—except in Kentuck, which has declined to 36.

(By Telegraph.)

PER SHARE.	Sept. 29.	Oct. 1.
Savage	37¾	38¼
Yellow Jacket	26¾	28
Kentuck	46	36
Chollar Potosi	54	54½
Gould & Curry	105	112
Belcher	No sales.	1⅛
Imperial	No sales.	" 249
Amador	—	—
Crown Point	—	—
Ophir	—	—
Alpha	—	—
Hale & Norcross	—	—
Empire Mill	—	—

The Slate Trade.

NEW YORK, Oct. 8, 1870.

We learn from the Poultney *Bulletin* that the Eureka Slate Co., of that place, has just shipped eighteen car loads of what is known as the unfading green slate, billing it directly to Messrs. ROBT. ABLARD & Co., London, England. This is the largest shipment of slate ever made from this section to England. We are extremely glad to hear this, as we have been watching with considerable interest the shipment of American slate to the Old World. We can now no longer consider the matter as an experiment, as it seems beyond a doubt that a large part of our green slates will be wanted in Europe for ornamental work.

Our correspondent from Slatington writes that there is but little demand for roofing slate at present. Trade in school slates is looking up, although prices remain steady.

Prices of Slate in New York.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	..	$6 50@	7 00
" green, 1st " "	..	6 50@	7 00
" red, 1st " "	..	15 00@	16 00
" variegated, " "	..	5 75@	6 25
Pa. b'k and d'k blue, 1st qual., "	..	7 00@	8 00

VERMONT SLATE TRADE.

REPORT of Slate Shipped from Middle Granville, N.Y., via the R. & S. R. R., for the week ending October 1, and for the year 1870.

ROOFING SLATE.

NO. OF SQUARES.	Week.	Prev'ly.	Year.
Penrhyn Slate Co	175	3,590	3,765
New York Slate Co	....	2,950	2,950
Middle Granville Slate Co	66	381	446
*American Slate Co	....	....	....
Benj. Williams	75	978	1,053
Jones & Williams	....	70	70
Eagle Slate Co	....	153	153
H. W. Hughes	35	166	151
J. D. Jones	35	....	35
Total	385	8,238	8,623

* Penrhyn and American Co.'s shipments are consolidated for this season.

MANTELS, &C.

NO. OF CASES.	Week.	Prev'ly.	Total.
Eagle Slate Co	.....	.....	.....
Penrhyn Slate Co	228	1,198	1,427

MILL STOCK.

NO OF CASES SHIPPED BY	Week.	Prev'ly	Total.
Eagle Slate Co.....cars	1	14	15
Penrhyn Slate Co	"		

Hydeville, Vt.

ROOFING SLATE.

	WEEK.	PREVIOUSLY.	YEAR.
Eagle Slate Co.....sqs.	120	185	305
Western Vermont Slate Co	..	20	20
Blue Slate Co	40	280	320
The Evergreen Slate Co	251	340	591
Forest Slate Co	..	80	80
West Castleton	..	90	90
E. D. Billings	..	47	47
R. M. Copeland	..	80	80
W. E. William	..	80	80
Total	411	1202	1613

MILL STOCK.

Eagle Slate Co	1294 feet	..	1294ft.

FINISHED MANTELS.

West Castleton Slate Co. box.	48	201	249
Forest Mining "	65	71	136
Total	113	272	385

BILLIARD BEDS AND BLACK BOARDS.

Eagle Slate Co.....box.	22	20	42
Western Vermont	100	30	31
West Castleton Slate Co	1	49	149
Total	123	99	222

TILE.

Eagle Slate Co.....feet	1407	..	1407

PENNSYLVANIA SLATE TRADE.

SHIPMENTS OF SLATE OVER THE LEHIGH VALLEY, AND LEHIGH AND SUSQUEHANNA R. R., AND THE LEHIGH CANAL:

For the week ending October 1, 1870.

LEHIGH VALLEY R. R.

ROOFING SLATE.

Jones & Williams	175 squares.
Locke Slate Co	105 "
Jones & Town	35 "
D. Williams & Co	70 "
Henry Bros	35 "
Hope Slate Co	70 "
Total	455 "

SCHOOL SLATES.

A. W. Lerch	134 cases.
D. Williams	119 "
Lehigh Slate Co	56 "
Locke Slate Co	12 "
Total	321

MANTELS.

Lehigh Slate Co	41 cases.
Yerkes & Martin	66 "
Total	107 "

BLACK BOARDS.

Lehigh Slate Co	4 cases.

LEHIGH AND SUSQUEHANNA R. R.

ROOFING SLATE.

Eagle Slate Co	105 squares.
J. M. Coffin & Co	35 "
H. W. Harper	70 "
Twin City Slate Co	70 "
Thos. W. Parry	70 "
T. Beck & Co	70 "
Pennryhn Slate Co	10 "
Total	430 "

LEHIGH CANAL.

ROOFING SLATE.

Lehigh Slate Co	100 squares
Brooklyn Slate Co	125 squares
Total	225 "

	Week.	Previously.	Total for Year.
L. and S. R. R.	430	6,737	7,167
L. V. R. R.	455	16,412	16,867
Lehigh Canal	225	2,802	3,027
Total	1,110	25,951	27,061

A New Street Conveyance.

THE *Daily Telegraph*, published at Melbourne, gives a description of a new street conveyance which has been patented, and which may, at no distant day, be seen in our own streets, as well as those of the Australian city: "What is sought in the invention is to give each passenger an independent seat, separated by arms from the adjoining one, as in the first-class railway carriages; to provide that the entering passenger shall not interfere with the comfort or convenience of passengers already seated; to give ample ventilation; to provide instant ingress or egress at one step from the ground, and to diminish the nuisance of dust in dry weather or mud in wet weather. In the new style of conveyance recently patented by Mr. DYER, instead of the passengers being inside the vehicle, as at present, they are all outside of it. There is no close box into which twelve human beings are stuffed, to inhale each other's respiration and exhalation. There is no crushing up for a seat, or putting seven into a space intended for six, and not too large for five. All inconveniences are avoided by placing the passengers back to back, instead of face to face. But it will be seen that in an omnibus of the ordinary construction, such an arrangement would necessitate a width and consequent weight that it would be impossible to allow when the external hind wheels are considered. It is precisely here that the great difference is made. The new omnibus has only one hind wheel instead of two, and this one wheel placed in the centre of the vehicle, does the work of the two now used. Let our readers suppose a break, such as is used to train horses in. The beam to which the hind wheels are attached is a double beam of iron, having a space between its side of some nine inches. In the slot, or aperture thus formed, is suspended a very large and powerful wheel, some six feet six inches in height. This supports the whole weight of the hinder part of the carriage. Hanging down from these parallel iron bars are some bent iron rods, to which the seats for the passengers are suspended. There is a row of six seats on each side of the vehicle, separated from each other by arms, with a low foot-board raised only fifteen inches from the ground. A light and elegant roof covers the two rows of seats, and reaches down in front far enough to shelter the passengers from rain or sun, but not far enough to obstruct their view of the opposite side of the street in which they are going. There are aprons, also, which draw up from the foot-board as a protection in wet weather. The vehicle, therefore, is much lower than the present omnibus, being only about eight feet in height. A passenger steps in and out at one effort from the street. He or she is independent of his or her neighbor. As to the large wheel at the back, this is quite concealed, and revolves in a closed case, or sheath, some twelve inches in width. The lowness of the foot-board on each side, and at the end, entirely conceals this large wheel from view, so the mode of supports of the hind part of the carriage cannot be perceived from the street. In fact, the seats being on two sides and the end, and being comfortably padded at the back and cushioned, will somewhat resemble that piece of furniture known as an ottoman, with arms to it and a roof overhead. There will be an immense economy in construction, as there are no doors, no glazing, no painting of sides, no internal panelling, and only three wheels instead of four. The draught on the horses will be much lighter, as the friction will be diminished by one-fourth at least. In addition to this, it is known that a wheel of large diameter is much easier to draw than one of small, so that there is no doubt but that the draught will be very largely lessened. The weight of the vehicle will not be more than two-thirds of the present one, and the cost also."

Diving Operations in Deep Water.

CAPTAIN LODGE has just returned from China with his divers, after the most successful expedition of the kind that has ever come under our notice. The ship "Hamilla Mitchell" was lost in August, 1869, on the Leuconna Rocks, near Shanghai, and Loyd's agent in his report considered the cargo and treasure hopelessly lost, as the depth of water was so great and the position too dangerous for working. Captain LODGE, however, undertook the task, and left England in March last with two experienced divers—Messrs. R. RIDYARD and WM. PEAK, of Liverpool. The diving apparatus, on a new principle and specially constructed for deep-sea diving, was supplied by Messrs. SIEBE & GORMAN, submarine engineers. Upon their arrival at Shanghai, Captain LODGE engaged the pilot cutter "Maggie," and proceeded to search for the wreck. This operation had to be effected by means of a boat, as the larger vessel could not proceed so close to the high rocks. The diver at length, after a search in various depths, varying from 120 ft. to 145 ft., found the wreck, where the after part containing the treasure had rolled into deep water—viz., 23 fathoms or thereabouts. After some difficulty RIDYARD succeeded in obtaining access to the treasure-room, where he found that some of the dollars were lying in heaps, the worms having eaten the wood boxes so that they were completely riddled. After four successful trips, the last of which proved the most advantageous, he having worked four hours consecutively under water, he sent up the contents of 64 boxes, and returned on deck quite exhausted from having worked so long at the great depth mentioned, a feat which was never performed by a diver before this occasion. The Shanghai papers blame the commander of the man-of-war stationed there for not affording protection to the expedition. Captain LODGE in his report states that upon their last trip, when they had a large amount of recovered treasure on board, they had to weigh anchor and pull with oars till a breeze sprung up, a considerable number of piratical junks being observed from the summit of the island pulling or sweeping towards the Leuconna Rocks. A breeze sprang up during the night, which enabled the expedition to reach Shanghai in safety.

Soluble Glass on Bands of Machinery.

SOLUBLE glass has been successfully applied on bands of machinery to restore elasticity and polish, and is found to be better adapted for the purpose than gum arabic and similar substances. Experiments upon the leather straps of a spinning jenny are said to have proved entirely satisfactory.

On the Utilization of Sewage, with Special Reference to the Phosphate Process.*

By DAVID FORBES, F. R. S., etc.

SINCE the universal adoption, in this country, of water as a medium for carrying off the excreta in towns, the difficulties of dealing with the sewage question, so important from a sanitary point of view, have been immensely increased, as instead of, as formerly, having to do with but a comparatively small amount of the original matter, we now have this amount diluted to several hundred times its bulk or volume, with, at the same time, (at least in most cases) a proportionately still greater decrease in its agricultural value, owing to the admixture of the waste products from chemical and other manufactures, which in themselves are not only valueless, but frequently even highly injurious to vegetation.

As all the water, except what is carried off by evaporation, both in the excreta as well as what is added in order to float them off, must ultimately, by gravitation, find its own way to the rivers and sea, or sink into the ground to pollute the wells and springs around; and since there is no likelihood of the employment of water being discontinued, there remains no remedy but to look this difficulty boldly in the face, and attempt to overcome it by devising some method, or rather methods, (for I feel confident that no one system will be found advantageous or applicable to all local circumstances) by which the sewage may be utilized, or at least prevented from being, as at present, not only a nuisance, but also a source of danger to the population around.

All the systems hitherto employed for this purpose may be classed under two heads—the purely Mechanical and the Mechanico-Chemical. Under the first the sewage (lifted by pumping to a higher level when necessary) is allowed to flow directly into the nearest river or sea, to destroy the fish, pollute the stream, and carry the germs of disease everywhere to which such contaminated water can penetrate; the only improvement in latter times being that, at some places, the sewage is allowed first to settle and deposit the larger portion of its solid contents, or is passed through some species of filter, which, acting mechanically, keeps back the suspended particles.

Although sewage water so filtered may appear perfectly clear to the eye, it hardly requires chemical analysis to show that it has not in reality been purified to any extent; the fœtid smell which it emits, or which is soon developed upon standing, indicates that much organic matter capable of entering into putrefaction still remains in solution; and, although such putrefaction may in some degree be counteracted or retarded by the use of disinfectants or antiseptics, (like carbolic acid, etc.) still I think it is now generally acknowledged that the required putrefaction cannot be effected by any merely mechanical system whatever.

Coming now to the mechanico-chemical systems proposed for the utilization of sewage, we must class sewage irrigation under this head, not because it involves (at least as usually carried out) any direct chemical treatment of the sewage, but because this system is based upon a combination of purely mechanical filtration, the soil acting as a filter, with the chemical action brought into play by the growth of the vegetation, which decomposes and assimilates the organic matter and other available substances, both in the liquid as well as in the solid matter of the sewage; and, provided the proper ratio be observed between the supply of sewage to the ground and the capabilities of the crops to assimilate its contents, the surplus water will drain from the land in a comparatively pure and innocuous condition; so that this system, which might be appropriately termed the natural system of sewage irrigation, if properly carried out, utilizes at once both the entire liquid as well as solid contents of the sewage, and leaves nothing more to be desired, provided only that the local circumstances are favorable to its being carried out.

It must not, however, be supposed to be without its drawbacks, and there are also numerous localities where sewage irrigation does not appear to be either applicable or advantageous.

It must be remembered that the distribution of fœtid sewage water must taint the surrounding air; and when the soil does not allow the sewage to sink quickly into its substance, or, especially if stiff clay or not well drained, becomes saturated with sewage, the smell may become so offensive that the neighborhood will not submit to it; and it is no wonder that, under such circumstances, evidence has already been brought forward to prove that (for example, at Croydon) contagious fevers are either generated or become more prevalent. It is also stated that sewage irrigation is not suited for all crops, although very advantageous for some, as, for example, Italian rye-grass; so it becomes a question also as to whether a sufficient sale can be obtained for such crops in the neighborhood; and in the case of one sewage farm last year I am informed that this was not the case. As far as present experience goes, it indicates also that the continued use of sewage over the same land ultimately tends to produce an unhealthy condition of vegetation; and certainly it appears to have been proved that a limit is soon reached beyond which the application of more sewage may even be positively injurious.

The expense for machinery and appliances for pumping and distributing the sewage of many large towns, especially when the sewage cannot be all brought to one centre, must often be so great as to deter companies, or even municipalities, from adopting this system; and in many cases suitable land cannot be obtained at all, or only at such great distances as to still further augment this great outlay. Besides this, it must be borne in mind that the area of land required to assimilate the whole of the sewage of a town like London, or any of our great commercial centres, without becoming supersaturated, will be both extremely large as well as costly, since the value of land in the immediate neighborhood of large towns is, as a rule, not dependent upon the value of the crops it will furnish, but is of a fictitious but infinitely higher value for building sites, etc. As regards the area required for sewage cultivation, I was informed, on a recent visit to the sewage farm at Warwick, that, after a three years' trial of 100 acres, it was found that double this amount of land would be required in order to fully utilize the entire sewage. Now as Warwick has only 10,000 inhabitants, and is particularly favored by being a strictly rural town, without any chemical or other manufactories, it would follow, at this rate, that it would require much more than 60,000 acres to absorb the sewage of London.

Fully admitting the advantages of sewage irrigation when applied in certain localities, I still believe that, taking all the above circumstances into due consideration, you will agree with me as to the importance of searching for some chemical process by which the sewage may be deodorized and purified at once, at least to such an extent that the supernatant water may be directly run off into the rivers or sea, without danger to health or animal life, and thus avoid the necessity of erecting costly works for the collection and transmission of the sewage to localities miles distant, where it is distributed to taint the surrounding atmosphere.

Many attempts have, as might have been expected, been already made in this direction. As early as 1845 works were erected in Edinburgh, to which I acted as chemical adviser, in which the sewage was treated with lime, a process which, in later years, has been carried out at Leicester, Tottenham, and Blackburn, but which has proved a failure, in a sanitary point of view, because it did not effect a sufficient purification of the water, and, as a commercial speculation, because the precipitate or manure obtained was comparatively worthless, being actually of less value than the original deposit from the sewage itself.

The treatment of sewage with lime and chloride of iron, as used at Northampton, is a process which, although apparently an improvement upon the treatment by lime alone, (at least in so far as regards the purification of the affluent water) has also failed as a commercial success for the same reasons.

It has been known from very ancient times, that alum has a remarkable decolorizing and purifying influence on foul water, which appears to be due to the property which alumina and certain other compounds have of forming combinations with organic matter, and producing compounds more or less insoluble in water, a property which has long been utilized in the arts of dyeing, the manufacture of pigments and sugar, the clarification of liquids, etc., and which of late years has been applied to the purification of sewage, the salts used being ordinary alum and crude sulphate of alumina. The purification of sewage water so effected is, however, not considered by the Rivers Pollution Commission to be sufficient, and the value of the precipitated deposit, when used as manure, is but little better than the mere deposit from the sewage itself.

The so-called A B C process, which has of late been prominently placed before the public in connection with the Leamington and Hastings sewage, is carried out by adding to the sewage an extraordinary mixture of clay, along with alum, blood, animal or vegetable charcoal—burnt clay, salt, magnesian limestone, and compounds of magnesia and manganese, the last five substances, if not necessary, being omitted.

The major part of the purifying mixture is the clay, and next in quantity the alum, all the other substances being added in so insignificant a proportion that they can hardly be expected to influence the result in any great degree. The chemical action of the alum has been already alluded to, but the clay seems to play a mere mechanical part, by entangling the suspended matters in the sewage, and so causing them by its weight to sink down, or transport them to the bottom of the tank more quickly. An inspection of the working of the process at Leamington made me endorse the opinion already given by the Rivers Pollution Commission, that it altogether failed to effect any sufficient purification of the sewage water, or to produce a manure of such commercial value as could possibly insure its sale at a price which could pay for its carriage to any distance beyond its immediate neighborhood.

Having now alluded to all the principal methods which have already been tried for sewage purification and utilization for manure, I will call your attention to an entirely novel process now brought forward by Dr. APSLEY PRICE and myself, and which we have called the phosphate process.

This process is founded on the fact that certain mineral phosphates easily obtainable, especially those containing alumina, when in a hydrated or freshly precipitated state, eagerly combine with the organic matter contained in the sewage, it being sufficient merely to agitate them in the most fœtid sewage to deprive it of all its odor and color, even if tinctorial substances of great intensity be present in the solution at the same time, whilst the phosphate of magnesia combines with the ammonia contained in the sewage, and precipitates it also in the state of the double phosphate of ammonia and magnesia.

The precipitate subsides rapidly, and the water drawn off is, as you see in the experiments here before us, quite transparent, colorless, and has so little perceptible taste that you can drink it without repugnance if you can only banish the idea from your minds that it has only just been obtained from so filthy a source.

The process is, as you will see, an extremely simple one, and requires nothing beyond a reservoir for holding the sewage whilst it is submitted to the operation. The phosphates are preferably added, in the state of solution, in sulphuric or hydrochloric acid, to the sewage, and their precipitation in the hydrated form, along with the organic matter in the sewage, and more or less of the ammonia (dependent on the strength of the sewage and amount of time allowed to stand) is instantaneously effected by the addition of a small quantity of milk of lime, just sufficient to neutralize the acid which holds them in solution, the deposit subsides rapidly, and the supernatant water may at once be run off and discharged into the river.

Before commending this process for adoption we must necessarily be prepared to answer two questions, as to:

(1.) Whether the water discharged after this treatment is sufficiently pure to be permitted to flow into the rivers? And

(2.) Whether the valuable constituents of the sewage have been precipitated?

Before answering the first of these questions another must be asked, which is: When can such water be regarded as sufficiently pure? And on this point opinions are much divided; some demanding a standard of purity as high, or even higher than many natural drinking waters, whilst others are content when the affluent water is colorless, clear and devoid of offensive smell. As the old saying is: "Whilst the doctors differ the patient dies," so in this case we still find the most offensive sewage allowed to run into and pollute our streams, because the present processes, although certainly better than no treatment at all, have not as yet secured such an ideal standard of perfection as practically they are not even likely ever to attain.

As regards the phosphate process, we do not claim that the affluent process is by anything like as pure as the water supplied for drinking purposes, but are content with showing that it is as transparent and colorless as ordinary river water; that it can be taken into the mouth, and even drunk, without repugnance; that fishes can live in it; and, most important of all, that it is not only free from any offensive smell, but, as in the specimen on the table before you, has remained for months, during the entire hot summer of this year, without showing any tendency to putrefy or emit any disagreeable odor. So that, for the above reasons, we believe that the affluent water from the phosphate process may be allowed to flow directly into the rivers, without injury either to the fish in them or the health of the inhabitants on their banks.

Coming now to the second question, I would premise by stating that I believe that the agricultural value of sewage has, in general, been much over-estimated. That the excreta may have originally represented a value of from eight to twenty shillings per head, as estimated by various writers, is not improbable; but it is as incorrect to regard the sewage as representing the same value as the original excreta as, for example, to assert that the water in a barrel into which a bottle of brandy worth five shillings had been poured was equal in value to the original brandy; and I imagine that the most inveterate toper would decline to drink off the barrel for the sake of utilizing the brandy in it. The whole of the brandy could be recovered by distillation, but probably at a cost greater than its value; and this would also be the case with sewage if we attempt to extract the entire manurial contents.

Chemists are all agreed that no chemical combinations are known by which the whole of the sewage contents valuable for agriculture can be precipitated; and in our attempts, fully recognizing this, we have only endeavored to extract so much as will leave the affluent water in a condition sufficiently pure as to be innoxious. In regard to the ammonia, the phosphate process converts it into the most insoluble compound known, the double phosphate of magnesia and ammonia, and the extent to which it is recovered is dependent upon the length of time allowed for subsidence and the solvent action of the water, whilst, as before stated, the experiments already made with London sewage from Barking Creek show that the purified sewage retains but a mere trace of organic matter.

A most important feature of the phosphate process, however—one in which it differs from all those already described—is the fact that the substances employed in the purification are only such as really augment greatly the agricultural value of the precipitated manure, and thus make it sufficiently valuable to bear the cost of transport to a distance.

The solid deposit from sewage, when considered as a manure, is admitted to be but of extremely little value; so that if, as in the A B C and other processes, a large amount of clay or other equally worthless substance is added, this small value per ton is diminished to an extent that the resulting manure becomes utterly worthless, except in the immediate vicinity of the works. On the other hand, by the new process, what is added are compounds rich in phosphoric acid, in a state of combination available for immediate assimilation by the plants themselves.

The natural phosphate of alumina, which we specially recommend, is a product which at present has no commercial value, and occurs in the West Indian Islands in such enormous quantities that on one island alone the report of the survey estimates the deposit at no less than 9,000,000 tons. Many other natural phosphatic deposits, found both in this country and elsewhere, are also capable of furnishing an abundant supply of material well suited for carrying out this process at but a very small expense.

In conclusion I may state, that the object in bringing forward this communication is to direct attention to a process which, we believe, may prove an extremely valuable one in such localities as are found unsuitable for sewage irrigation, for some of the reasons before stated.

* Read before the British Association, Liverpool Meeting, Section B.

Taking the Dross from Furnaces.—The invention of Mr. G. D'ADILSWARD, of Paris, consists, first, of a cast-iron cistern, divided into two compartments by partition; the cistern is constantly kept full of water; second, of two hydraulic presses, or other lifting apparatus, each having a plate or platform. These plates are intended to carry small wagons, which remain immersed to receive the dross. The presses work alternately, so that there is always one wagon receiving dross. They may be worked by a natural water-pressure, when obtainable, or by an arrangement of accumulators. The presses are only mentioned here as a means of lifting the wagons, and they might be replaced by cranes, or by any suitable lifting apparatus.

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

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The Heaton Process.

This process for the manufacture of cast-steel, which is in successful operation in England, has as yet attracted but little attention in this country. By the Bessemer and Siemen's-Martin processes, a great revolution has been effected during the past few years, in this branch of industry, and it is very possible that some process may yet be introduced which will throw them both into the shade. A great deal has been claimed for the Heaton process by its partisans, but in the absence of any impartial and entirely reliable account of its achievement, we have hitherto refrained from anything more than short notices of it. We have now before us a report on the subject, made by M. L. GRUNER, whose investigations were undertaken in the interests of French manufacturers. Mr. GRUNER'S high reputation as a metallurgist and great interests which he had committed to his care, we consider sufficient guarantee for the care exercised and for the accuracy of his statements. The report is very complete, embracing a description of the furnaces and other apparatus used, as well as an account of the process itself and the method of proceeding, besides giving the results of several analyses of the iron used and of the product of the process.

The operations witnessed by Mr. GRUNER were conducted at the Langley mill and at the Stanton furnace between Langley mill and Trent. The iron experimented upon was from the department of the Moselle, France, as it was intended to test the availability of the process for that locality. The process is divided into two parts, the production of crude-steel and the manufacture of cast-steel from the first product. Chili saltpetre (an impure nitrate of soda), is used to oxidize the carbon, silicon and other foreign substances in the cast-iron. The product styled crude-steel by HEATON, seems to be an iron containing from one to two per cent. of chemically combined carbon. Mr. GRUNER is convinced that the use of Chili saltpetre for puddling is only economical when the product is intended for the production of steel.

Several different kinds of furnaces have been employed by the inventor in experimenting with his process, but we only give a brief description of the latest. It consists of a cylindrical furnace shaft, the lower portion of which is made of strong sheet-iron, lined with fire-brick, and which can be detached and removed from the main portion of the furnace, as a large cylindrical kettle capable of containing from fourteen to thirty-two hundred weight of iron. The large furnace at the Langley Mills has a hearth of one metre (3 feet 3⅜ inches, nearly) in diameter and two metres in height, up to the opening where the molten iron is introduced. In the bottom of this kettle the nitrate of soda, mixed with quartz-sand, and often with lime, binoxide of manganese, fluor-spar, or some other substance which it is thought would improve the quality of the iron, is tightly stamped down and covered with a perforated plate of either wrought or cast-iron. The object of this plate is to separate the gases generated from the saltpetre into small streams, and to prevent their too rapid formation at the commencement of the process. The molten iron is then run into the converter, either directly from the blast-furnace or from a cupola. While the oxidation is going on a thick smoke emerges from the top of the chimney. This at first is white, afterwards orange-red, grey, and finally black. During the final stage of the operation these gases take fire very readily, and burn with an intense yellow flame from the chimney top. At first the operation is usually very mild, in fact scarcely perceptible; but suddenly the reaction becomes very intense, and the operation reaches a pitch of energy scarcely exceeded by the Bessemer process. This sudden change in the activity of the reaction in the Heaton process is supposed to be due to the breaking up of the perforated iron plate, and the consequent contact between the molten metal and the saltpetre at the bottom of the hearth. The whole operation is usually completed in from two and a half to five minutes, though sometimes, when the iron poured in is not very hot and does not rapidly destroy the perforated plate, it has required as much as ten minutes. The brilliant flame from the top of the chimney lasts not more than one or two minutes. As soon as the gases evolved cease to burn they commence to change rapidly from a deep black to grey, and then disappear entirely. It is then perfectly safe to remove the hearth or converter. A short yellow flame still continues to play over the mass, but it is easy to determine, at this stage, the fluidity and comparative temperature of the refined metal. An ingot could easily be cast directly from the converter, as in the Bessemer process, but it has been found that the ingots from the Heaton process are usually porous, and hence the metal is allowed to cool in the converter until it has become a solid mass. It is then removed and broken up while still red hot. As we remarked above, the quality of the refined iron made in this way is by no means uniform. It resembles a half-puddled ball in the ordinary puddling process. The slag is as far from being uniform in its constitution as the iron.

Mr. GRUNER remarks very justly, that the addition of quartz-sand to the saltpeter, which is intended to remove silicon from the iron appears absurd, and in practice both quartz and lime appear to be rather an injury than a benefit to the product, though manganese or other substances which would improve the iron could be substituted.

The so-called crude-steel is used at the Langley mill, either for the manufacture of pure iron or steel. For making a pure wrought-iron, it undergoes a process differing but little from ordinary puddling, though the time consumed is much shorter. This is, however, a very expensive way of making a wrought-iron, which Mr. HEATON chooses to dignify with the name *steel-iron.* Steel is made from the crude Heaton-metal, either in a reverberatory furnace or in crucibles. At the Langley mill the latter are used, nor does the process differ materially from the ordinary one for making crucible steel.

In conclusion, Mr. GRUNER says that iron, containing from 0.3 to 0.5 per cent. of phosphorus, can be converted by this process into a steel, which, however, is found to be lacking in what he calls "body," or in other words, molecular adhesion. The Heaton crude-steel can only be classed with other materials for steel manufacture, and can in no sense be regarded as a finished product. As an addition of from 10 to 15 per cent. of Chili saltpeter is necessary, in order to convert an ordinary low grade iron into crude-steel, the process cannot be regarded as very economical.

Superficial Deposits.

THESE are always of comparatively recent geological formation. The deposits of *debris* are accumulations of mineral detached from its original localities by disintegrating influences, and conveyed, generally by water, to a new position. They contain, therefore, a great variety of material, from large boulders down to the finest sand or clay, in which the valuable minerals are imbedded. Sometimes these deposits are simply disintegrated—not washed away. They are then to be recognized by their freedom from water-worn particles, sand, etc., their general homogeneous composition, and their position in places where there are otherwise no signs of alluvial action. The most frequent superficial deposits of *debris*, however, have been accumulated by currents of water. The lighter minerals have been washed away, including all those ores which, by chemical decomposition, assumed forms of small specific gravity, or actually became soluble. Hence, it is not common to find pyrites, silver ores, or carbonates in placers, though the original deposits may have contained all these in great abundance. We find, on the other hand, principally gold, platinum, heavy tin ore, magnetic iron ore, specular-iron, and precious stones—all substances which combine high specific gravity with indifference to ordinary atmospheric agencies. The process which such deposits have undergone may be called a natural "dressing," or mechanical concentration. As in artificial concentration, so in this case, the size and shape of particles have also an influence upon their deposition, as may be seen in the stratified arrangement of sand, gravel, and boulders in any river bed. After such a deposit has accumulated, the passage through it of siliceous or calciferous waters, together with the pressure of new accumulations above, may cement it together in a solid mass, so that it can only be extracted by blasting, as if it were solid rock. California, Oregon, Idaho, Montana, and other Pacific Territories, give abundant examples of every form of placer deposit, including gravel and cement. The celebrated blue lead of California is the most notable instance of the latter. It is in an ancient river channel or system of river channels, running, in many cases, across the present streams, and now overlain with alluvium, or even with eruptive masses and hill ranges. The blue cement is rich in gold, but the numerous boulders of all sizes contained in it appear to be barren. The deposits along the banks and in the channels of present streams are doubtless still in the process of formation. Indeed, it is frequently the case that mining operations on the upper waters of a stream will cause in a year or two profitable placers on the bars and bends below. Artificial placers of this kind may be seen in almost any extensive placer region, as, for instance, on the Carson river, below the mills of Virginia, where tailings of considerable value have sometimes been gathered. It is an interesting question whether gold accumulated in placers increases in the size of its particles. The idea has been scouted by some scientific writers, but there are strong indications that such a process actually takes place. The greater purity and size of nuggets, etc., found in placers, as compared with the veins from which they were formed, indicates an aggregation or inorganic growth, preceded by a chemical reaction, removing silver and baser metals. GENTH, in 1859, concluded from the superior purity of the alluvial gold of the Southern States, that the veins could not, by their decomposition, have furnished it; but OSCAR LIEBER had already put forward a bold theory of the alteration of the gold by solution, precipitation, and agglomeration, which he supported with ingenuity, but received mostly ridicule for his pains. At that time the chemical possibilities were not fully known. Professor BISCHOFF, the eminent chemist and geologist, has since found that sulphide of gold is slightly soluble in pure water. It is now also known that chloride of gold will coexist, in very dilute solutions, with protosalts of iron, provided there is present an alkaline carbonate and a large excess of carbonic acid. If the sulphide of gold is required in solution, it is only necessary to charge the solution with an excess of sulphurretted hydrogen. In the same connection should be mentioned the discovery, from a different quarter, that metallic gold is soluble in solutions of the persalts of iron. It will be seen that these discoveries give a much larger range and greater probability of changes in the auriferous material once deposited in a vein.

But another and still more important series of experiments has been carried out by Australian chemists, and corroborated, we believe, in France. The latest reported results of these inquries are found in a paper on the formation of gold nuggets in the auriferous drifts, read before the Royal Society of Victoria, by Mr. COSMO NEWBERRY. The arguments and facts contained in that paper strongly support the theory of the growth of nuggets, and furnish a simple analogy in the precipitation of metallic gold from solution by the reducing action of organic matter, in the presence of a nucleus. The nucleus may be itself gold, or iron, copper or arsenical pyrites, galena, zinc blende, or sulphide of antimony, etc., and upon it the metallic gold collects in regular grains, accumulating in mamillary and even crystalline forms. This being the case in the experiments by which artificial nuggets and crystals of gold have been produced, we are led to believe a similar process possible in nature, especially since nuggets of drift-gold, when weighed, show frequently a less specific gravity than belongs to the metal; and, when sawn in halves, display, in numerous instances, the oxydized remains of former nuclei.

To some such process of solution and disposition we may ascribe the presence of gold in rocks and veins; its alteration and reduction to metallic form ("free gold") in the upper or exposed parts of such rocks or veins; and, finally, the still greater purity and size of its particles, so frequently noticed in placers. As LIEBER very forcibly remarked, if we are forced to believe in the reduction and molecular aggregation of gold above the water-lines in veins, we must expect the same process to be still more likely in placers which are more exposed to atmospheric agencies and percolating waters. It is not necessary to assume, however, that this process takes place in all cases. On the contrary, certain chemical reactions being involved, there must be certain coincident conditions. These we cannot here pause to discuss elaborately; and we will only add at present that this theory affords the only rational explanation of the influence of eruptive rocks upon auriferous deposits. HUMBOLDT, MURCHISON, and many other observers, have noticed the prevalence of eruptive masses in or near gold-bearing deposits, and many hypotheses have ascribed to these sources the introduction of the gold. The true connection between eruptive rocks and mineral deposits of gold, and several other metals, is to be sought in the abundance of thermal and saline waters accompanying and succeeding such eruptions. There is in most cases no reason to suppose that the metals themselves formed part of the eruptive mass. Lavas and traps are in general notably free from the metals concentrated in neighboring deposits.

To return to the subject of alluvial deposits, it must be confessed that the mechanical processes of deposition are by far the most universal and influential in such formations. As already remarked, superficial deposits sometimes occupy the precise locality of the rocks from which they are produced; as, for instance, numerous gold diggings in the southern and Pacific States on the very outcrops of auriferous veins. These, not having undergone to any extent the processes of mechanical concentration and accumulation, are not so rich as the placers of accumulation. COTTA lays down the following rules, deduced *a priori* from the method of formation, and confirmed in practice:

1. Placers *in loco* will be likely to carry metals in quantity and distribution like the original deposits on which they lie.

2. Alluvial placers of accumulation will be richest in those places where the current of the steam was interrupted by a diminution in its fall, by sudden change of direction, or by the entrance of a tributary; (I would add, also, by reefs, bars, and eddies.) The absolute richness, however, depends upon local circumstances, and the size and weight of the floated masses must be taken into consideration.

3. Especially rich are frequently, of course, the small depressions, holes, creases, and fissures of the bed-rock over which the current passed.

4. The lowest layers of each period of deposition are usually the richest.

5. Sometimes, however, several periods of deposition have succeeded each other; and thus several rich strata may occur in the same ground.

6. Not only the courses of present streams, but also, and

especially, the ancient channels, now forsaken, are the localities of placers.

Of these rules, the fourth and fifth especially deserve attention. A period of deposition may be understood as the time during which all the mass of alluvial material is sensitive to the action of water. By the gradual cementing process already alluded to, or by an interruption of the aqueous action, the alluvial layers may become so hardened as to form a new bed-rock; or, simply by great accumulated depth, they may cease to be affected to the bottom by the action of the stream. The result would be, if the deposition of material continued, a second series overlying the first, and having its own relative degree of richness in different strata. The miners of the Pacific coast have learned by experience that there are frequently two or three bed-rocks, and corresponding strata of maximum richness, alternating with others more or less barren. Many old diggings, supposed to have been exhausted, will undoubtedly be worked again with deeper bed-rock tunnels, and will yield more gold than ever. A striking instance may be found at Dutch Flat, in California.

Gold, tin, platinum, magnetic-iron, and precious stones are the principal valuable minerals occurring in placers. Tin placers have not yet been discovered in this country, except the stream-tin from southwestern Idaho, the specimens of which are promising, but the quantity available is not known. The vast deposits of Banca and Malacca, in the East Indies, are alluvial, though to some extent covered. The platinum-placers are mainly in the eastern Ural. This metal, as well as iridium and osmium, has been found with American gold; but our prospectors have as yet (possibly from lack of familiarity with the platinum, and possibly from not searching particularly for it) reported no locality where it might be obtained. In view of the great usefulness of this metal in the arts—limited only by the small supply and high price—the importance of finding it in this country in paying quantity is evident. Placers of copper occur in China and Brazil, and in Nova Scotia, on the coast of the Bay of Fundy, whore this metal, in crystals of pea-size, imbedded in clay, can be mined with the shovel. Artificial placers of iron ore occur on the coast of Elba, where are accumulated the débris washed down from the burrows of vast, open cuts made by the iron-miners on the mountains. Still more striking instances are furnished by the magnetic and titaniferous iron-sands of Canada and New England, and of New Zealand. The latter have been shipped to England, with indifferent pecuniary and metallurgical success. The iron-sands of Canada are now worked with success at Moisie; and the recent introduction of machines which separate the ore by means of magnets very rapidly and cheaply will doubtless result in a wide development of these deposits. Dr. T. STERRY HUNT recommends experiments with placers of this nature existing along the coast of Long Island Sound.

Returning once more to gold deposits, it should be remarked that, from the nature of their formation, placers are generally, in their richest parts, much richer, by virtue of the concentration they have undergone, than the strata or veins from which they are formed. The possible aggregation of particles to nuggets larger than the masses found *in situ* has already been noticed. But, under some circumstances, the veins may be richer than the resulting placers, as, for instance, when the original rock is so hard as to resist in a higher degree than the country rock the disintegrating influences, so that for every small portion of auriferous material detached an immense quantity of the baser débris is carried away in the same streams; or, where the peculiar arrangement of water courses is such as to scatter, instead of concentrating, the auriferous material. But these instances are rare. On the other hand, the amount of material to be extracted and treated for obtaining a given quantity of gold is generally much greater in placer than in vein mining. The removal of poor or barren strata, the search after the richer accumulations, and the vast amount of excavation required for ditches, etc., are heavy items; and it must be remembered that the capital thus invested must pay for itself in a short time or become a total loss. The average economical results of all the placer mining, compared with those of all the quartz mining for gold for the last twenty years in this country, would, we think, show a balance in favor of the latter.

The second class of superficial deposits is represented by beds of bog-iron ore, salt, soda, sulphur, etc. Salt and soda beds are common in the great inland basin of this country. They belong to the same category as the salt lakes, borax lake, etc. The great prevalence of alkaline deposits in those regions is due to the decomposition of a soda feldspar in which the porphyritic and trachytic rocks abound, and which is the first ingredient removed from them by heated waters or atmospheric agencies.

The source of the alkaline salts in all these lakes and marshes seems to be the hills around them and not the ground beneath. Thus the great salt field at Silver Peak, which covers with its snowy furnace nearly fifty square miles, is but a few inches or feet in depth, and hot and cold springs of fresh water come through it to the surface. Fresh water can in many other places be found by digging in the salt fields. We remember one instance at Lone Mountain, Nye County, Nevada; but the water, though not actually salt, is not pure. The hot spring in the Silver Peak Marsh appears to contain a good deal of lime. The manner of working these salt beds is described in the last report of the United States Mining Commissioner.

There is a remarkable deposit of soda about two miles north of the Sand Springs road, and fifty miles east of Virginia and Gold Hill. It is owned by parties in Carson and Virginia who use it in the manufacture of soap, and supply quartz mills with it as a chemical agent in the reduction of ores. They also furnish it to drug and grocery stores, where it is sold for washing and other purposes for which common soda is ordinarily used. It is said to be free from all earthy matter and to consist of 80 per cent. soda, the balance being other salts. The deposit is in the midst of an alkali flat of some seventeen acres in extent, and at the surface it appeared only about three feet wide, or more like a soda spring than anything else, the pure article forming in a crust over and about the strong watery solution. Upon digging beneath this, however, the solid soda was discovered in a defined mass. A shaft has been sunk beside it to the depth of fifty feet, from the bottom of which a drift has been made twenty-five feet into the vein or deposit of soda, without getting through it. The inclosing walls on each side are very distinctly defined, and are simply composed of a dark, heavy, compact iron sand, strongly impregnated with soda. Analagous deposits in Humboldt county, Nevada, have furnished excellent fluxes for smelting refractory ores.

Grass Valley.

TO THE EDITOR—Sir: I intended to give you a full account of the condition of mines at this time, and of mining operations during the last year in this county; but my data are not complete yet, and I must therefore defer much of that I wish to say to another time. A description of the great quartz mine of California, the Eureka, as it appears at the present time, and the approximate working results, together with a few remarks on the Idaho and the chlorination works, will therefore be all I can communicate at present.

Few gold quartz-veins in the world have yielded the precious metal as regularly and abundantly, year by year, as the Eureka of Grass Valley, Nevada county, Cal. The claim includes now, since the Roaunaire and adjoining claims have been acquired by the Eureka company, 3700 feet on the lode. The works are located a short distance (hardly a mile) from the town of Grass Valley, and overlook the village, which is one of the most delightfully situated places I have seen in California. The veins at Grass Valley may be classed, according to their strike, into two systems—those running east and west, and those with a north-westerly and south-easterly strike. The Eureka belongs to the first class. It has, like all the veins of this system, a steep dip, the first 300 feet in depth, inclining 78° south, while the portion so far opened below this point varies from 65° to 70°. The main shaft is very large, 6x18 feet inside the timbers, and is divided into four compartments—two for hoisting, one for sinking ahead, and one for pumping. The nine-inch pumps are built in three sections, the first reaching down to the second level, 260 feet; the second from here to the fourth level, 460 feet in depth, and the third to the sixth level, 255 feet lower. A sump of ten feet below this point is the deepest spot so far reached, making the total depth of the mine at the present time 725 feet on the incline. The thickness of the vein in the portions now accessible varies from three to seven feet, and can be safely put down as four feet on an average. I should mention in this connection a peculiarity of this vein, which contributes largely towards cheapening and facilitating the work of extracting the ore. This is the distinct arrangement of two streaks of quartz—one along the foot-wall, and one on the hanging-wall—which are very frequently separated by a horse of from a few inches to six feet in thickness. This horse is interwoven with many small quartz-stringers, which are generally so rich in sulphurets that the whole horse must go through the stamps. On the hanging-wall is a distinct selvedge, and by undermining ahead on the foot-wall, enormous masses of ore can be thrown down along the hanging-wall at a single blast. In a few localities both layers of quartz come together in the middle of the vein, without having the horse between. In these cases there is a line of quartz crystals visible, which fill the narrow cavity sometimes left. The whole v in shows very good evidence of the manner in which it has been formed. So-called "banded quartz" preponderates throughout the vein, and it is always found the richest in free gold and sulphurets. The vein is worked throughout by overhead stoping, shutes, thirty feet apart, being left open during the subsequent filling in of the stopes throughout the mine.

The Eureka company has always been noted for its good management of the mine, and has shown its business tact by keeping plenty of reserves ahead at any time. At present, for instance, the reserves in the mine furnish work for the force employed for the next four years; but they are nevertheless sinking slowly, and opening the mine further in depth. The ores now raised come mainly from between the fourth and fifth levels, a few tons only being taken from the upper levels, where a good deal of twenty-dollar rock has been left standing in former times. The amount crushed per month during the last half year has been 1600 tons, which have yielded in the neighborhood of $56,000 per month, enabling the company to declare a regular monthly dividend of $30,000, and an extra dividend of $30,000 in July. Ninety-six men, at three dollars per day, are employed in stoping, and one foreman for each shift of ten hours at four dollars per day. Thirty men are employed for sinking and driving tunnels. They do contract work, and receive in the tunnels from $10 to $12 per foot.

The Eureka ore shows very little free gold and little sulphuret. The latter, after concentration, are found to be about one and a quarter per cent. of the rock raised, and are further worked by the Plattner chlorination process. The company has its own works, but though they do custom-work besides their own, they can run the works only periodically, as it takes a long time to gather enough sulphurets to make a campaign. Nevertheless five more chlorination establishments have been built in the county, most of which lie idle.

The Eureka mill is a large structure running a crusher and thirty stamps, which reduce sixty-six tons of ore per day. The amalgamation process in use is the well-known blanket process. The Idaho is located on the eastern extension of the Eureka lode. The vein presents the same characteristics as the Eureka, but it appears that in the upper levels the quartz extends only about 300 feet east of the latter, where it pinches out. In the lower levels the quartz extends further, so that the line of termination would be on a flat incline from west to east. The shaft of this company is located a little over 200 feet from the Eureka line. The ore is taken out clean from the upper levels, and has yielded very fine returns. For the last six months, however, I am informed the mine has paid no dividends, though it pays expenses. They are now opening up the mine in depth, and take their ore at present from the fifth level. The mine having been in operation only a few years, you see that the shortness of their vein has compelled them to advance rapidly in depth; but you see, also, that in this direction lies their main hope for the future, as their field of operations extends continually in length.

The Empire, North Star, Rising Sun, and many others, are also in operation. The Greenhorn is a very promising mine, which has only lately come into notice. If I find the time I shall give you a few items in regard to them in a future communication.

E.

The Landore Siemens Steel-works.

AT last, after all the doubts and contradictory reports which have been spread about it, the Siemens-Martin process must be admitted to be a practical reality in this country. By the invitation of Mr. SIEMENS, the whole body of the members of the Iron and Steel Institute, during their recent meeting in South Wales, paid a visit to the Siemens steel-works at Landore. The works are in full activity in those parts which are now completed, while other parts of the works are in course of erection. The works, so far as they are at present finished, are entirely devoted to the Siemens-Martin process, and all the steel now made at the works is produced by that process. The display witnessed by the Iron and Steel Institute, had all the characteristics of regular commercial work. There were two charges of steel going on simultaneously, side by side, in two large steel-melting furnaces. The charges were at different stages of the operation—the one nearly finished and ready for tapping in the presence of the visitors, the other about three or four hours later. There was a Siemens puddling furnace at work for making blooms, which are charged into the bath of liquid steel, when finished, with all the cinder and slag adhering to them, these small quantities of oxides being considered advantageous, or, at least, harmless in their reaction upon the bath. All these furnaces, as well as a number of reheating furnaces, are provided with gas from a large and beautifully-arranged group of gas producers, and the regularity and care with which these different degrees of temperature are maintained in the different furnaces, all supplied with the same kind of fuel from the same source, could not fail to impress itself prominently upon every observant visitor. More than anything, however, the very high temperature of the steel-melting furnace, and the regularity with which it seemed to be maintained in the furnace, even after the introduction of a heavy charge of *cold* scrap-iron, was an object of real surprise to many a practical man who may have before that visit made up his mind very earnestly to trust to his own observation, and nothing else, for the evidence to be produced on that important point.

There were two points established beyond contradiction by the recent visit of the members of the Iron and Steel Institute to the Landore works, namely: 1. That the Siemens-Martin process can be carried on in a plain and business-like manner, in works properly laid out for it, without interruption and uncertainty as regards result; and, 2. That the product of the Siemens-Martin process, with proper selection of raw materials and care in the management, is steel of a quality fully equal to that of the products of other steel-making processes. The quality of the steel made was amply testified by the mode in which the ingots worked under the hammer and rolled out into rails in the excellent reversing rolling mill on the Ramsbottom system, made by Messrs. THWAITES and CARBUTT, from Mr. COWPER'S designs. So far the facts before the eyes of every visitor spoke for themselves, but there remained one question yet to be answered, and it was upon the lips of many a visitor to those works on that day. Will it pay? That is indeed an important question; but is it wise to ask it in this blunt and abstract form, or, at least, is it wise to expect an absolute and positive reply to it? Every process, provided that it is a success from a technical point of view, must pay, if the prices of raw materials and cost of working are lower than the market price of the product, and unless that condition is fulfilled, no process can pay at all. Whether or not the prices of raw materials in any given locality will be favorable to the Siemens-Martin process or otherwise, is a purely local question and depends upon circumstances, which differ so widely that the conclusions which will be arrived at in one district may be diametrically opposed to those which are based upon the facts existing in other localities.

Given an unlimited quantity of Bessemer pig-iron, say at £4 per ton, the price for crop ends of Bessemer steel rails, or of best wrought-iron scrap, or the price of a puddled bloom made from iron free from sulphur and phosphorus will decide the question, one way or another, whether the Siemens-Martin process will pay as a supplement or accessory to the Bessemer process. But there are localities where the "unlimited supply" of grey Bessemer pig iron is not given, but where an abundance of good white iron is available both for the bath of the Siemens-Martin process and for the puddling furnace. Such localities are the charcoal iron districts of Sweden, Styria, and Upper Hungary, and some parts of France and Russia. In such places the Siemens-Martin process will occasionally produce a steel ingot at a much lower cost than the Bessemer process, or any other method of steel-making known at present would do. In such localities the range of applicability of the Siemens-Martin process is very wide, and its prospects very great. It is a mistake, therefore, to look upon the Siemens-Martin process as a kind of rival to the Bessemer process,

which contends for the same field of application, and must be either driven from that field by the Bessemer process, or drive away the latter in its turn. The spheres of applicability for the two processes are distinct, and the natural conditions which favor the one or the other, provide in themselves for the proper division of labor between those two modes of steel manufacture, which very often will work side by side and hand in hand, but will rarely, if ever, meet in opposition to each other in any limited field of industry.—*Engineering.*

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107,854.—PROCESS FOR SEASONING LUMBER.—Henry A. Beach, Rome, N. Y.

107,855.—HANDLE FOR MILK-CAN.—Alvin C. Beckwith and George H. Graham, Oriskany, N. Y.

107,556.—GRAIN-SEPARATOR.—Frederick A. Begole, Jackson, Mich.

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107,870.—HOSE BRIDGE.—Walter E. Cameron, Taunton, Mass.

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107,875.—MACHINE FOR DRILLING CARRIAGE SHACKLES.—James B. Clark, Plantsville, Conn.

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107,882.—ROULETTE.—Archibald H. Crozier, Oswego, N. Y., and Martin Taylor, Hartford, Conn.

107,883.—PORTABLE FENCE.—Wells Crumb, Coloma, Mich.

107,884, antedated September 21, 1870.—STREET LAMP.—Gustavus Cuppers, New York, N. Y.

107,885.—BARREL-HEAD.—Reuben De Bare, Philadelphia, Pa.

107,886.—SAW-MILL.—Jesse E. Dorr, Williamsport, Pa.

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107,894.—KNIFE-GRINDING MACHINE.—Edward S. M. Fernald, Saco, Me.

107,895.—SAFETY-LATCH.—J. W. Fifield, Franklin, N. H.

107,896.—MACHINE FOR POLISHING THE EYES OF SEWING-MACHINE NEEDLES.—Thaddeus Fowler, Tottenville, N. Y., assignor to "Excelsior Needle Company," Wolcottville, Conn.

107,897.—MOP-HEAD.—Oliver S. Garretson and Joel G. Garretson, Buffalo, N. Y.

107,898.—MANUFACTURE OF ICE.—John F. Gessner, West Farms, N. Y.

107,899.—GRATE.—Francis Glick and Uriah Keck, Allentown, Pa.

107,900.—WATER-METER.—John Warner Groat, New York, N. Y.

107,901.—MACHINE FOR MAKING CLEVIS.—John S. Hall, Pittsburg, Pa.

107,902.—ADJUSTABLE WINDOW-SHADE.—E. Warren Hastings, Boston, Mass.

107,903.—MACHINE FOR FINISHING WHEELS FOR WATCHES.—James L. Hathaway, Norfolk, Va.

107,904.—PRESERVING WOOD.—Joshua R. Hayes, Washington, D. C.

107,905.—HORSE-COLLAR TOP.—Isaac Hicks, Hartford, Wis., assignor to himself and James O. Kendall, same place.

107,906.—STUMP-EXTRACTOR.—Johnson Higgins, Friendship, N. Y.

107,907.—NECK-TIE.—John G. Hitchcock, New York, N. Y.

107,908.—CORN-PLANTER.—Hezekiah R. Holland, Wilmington, Va.

107,909.—PROJECTILE.—James G. Hope, Topeka, Kansas.

107,910.—CEMENT FOR PAVING AND BUILDING.—Joseph Evans Hover, Philadelphia, Pa.

107,911.—MACHINE FOR TURNING SPOKES.—John W. Hoffman, Fremont, Ind.

107,912.—LIFE-BOAT.—Herbert Humble, Milwaukee, Wis.

107,913.—MACHINE FOR MAKING FAN-STICK.—Edmund S. Hunt, Weymouth, Mass.

107,914.—WAGON-LOCK.—Sidney S. Hurlbut, Cordova, Ill.

107,915.—GRAIN-DRILL.—Joseph Ingles, Milton, Ind.

107,916.—MAINSPRING-BARREL OF WATCH.—Henry B. James, Trenton, N. J.

107,917.—SURGE-RELIEVER.—John E. Jones, Wiretown, N. J.

107,918.—MACHINE FOR TURNING OR PLANING THE INSIDE OF BELL, OR OTHER CASTING.—Octavous Jones, Troy, N. Y.

107,919.—CORN-SHELLER.—Jobert Jordan, Pickens county, Ala.

107,920.—HAIR-CURLER.—John W. Kenny and John H. Adams, Albany, N. Y.

107,921.—TREADLE FOR SEWING AND OTHER MACHINERY.—George Byron Kirkham, New York, N. Y.

107,922.—COTTON-OPENER.—Richard Kitson, Lowell, Mass.

107,923.—BARK-MILL.—Charles Korn, Wurtsborough, N. Y.

107,924.—ROCKING OR TILTING CHAIR.—James Lamb, Hubbardston, Mass.

107,925.—MOLD-BOARD FOR PLOW.—John Lane, Chicago, Ill., assignor to Hapgood & Co., same place.

107,926.—CAR-PUSHER.—Rufus Lane, Freeport, Ill., assignor of one-half his right to G. W. Moore, same place.

107,927.—CIGAR-MACHINE.—John Lauritzen, Newark, N. J.

107,928.—HOT-AIR ENGINE.—Charles P. Leavitt, New York, N. Y.

107,929.—HAMMER-STRAP.—William J. Lewis, Pittsburg, Pa.

107,930.—RACK FOR WAGON-BRAKE.—William J. Lewis, Pittsburg, Pa.

107,931.—BLANK FOR HAMMER-STRAP FOR WAGONS.—William J. Lewis, Pittsburg, Pa.

107,932.—MEAT AND VEGETABLE-SLICER.—Peter H. Lindsey, Lockport, N. Y.

107,933.—GRAIN-BINDER.—William Lottridge, Charles City, Iowa.

107,734.—WATER INDICATOR AND ALARM.—Mirabeau, New Albany, Ind.

107,935.—FLOUR-BOLT.—John Mallin, Chicago, Ill.

107,936.—WATER CUT-OFF FOR CISTERNS.—Jacob R. Manny, Chicago, Ill.

107,937.—GUANO-DISTRIBUTER.—William E. Martin, Oconee, Ga., assignor to James D. Barber, same place.

107,938.—SULKY-PLOW.—Henry W. Mason, Hagarstown, Md.

107,939.—PAINT-MILL.—John W. Masury, Brooklyn, N. Y.

107,940.—IRONING-TABLE.—Henry McChesney, Buffalo, N. Y., assignor to himself and Loseph W. Clark, same place.

107,941.—STAIR-ROD.—William T. Mersereau, Orange, N. J.

107,942, antedated September 24, 1870.—MANUFACTURE OF PURIFIED CAST-IRON FROM THE ORE.—John W. Middleton, Philadelphia, Pa.

107,943.—CUTTER-HEAD FOR PLANER.—John Nore, New York, N. Y.

107,944.—FEATHER-RENOVATOR.—Matthias K. Morris, Council Bluffs, Iowa.

107,945.—BALANCED SLIDE-VALVE.—George Frederick Morse, Portland, Me.

107,946.—EXPANDING TRAP.—Frank Murgatroyn, Cleveland, Ohio.

107,947.—PIANO-LOCK.—John Murphy, Roslindale, assignor to Oren J. Faxton, Boston, Mass.

107,948.—DAMPER-REGULATOR.—James H. Murrill, Baltimore, assignor to himself and Lewis R. Keizer, same place.

107,949.—ICE-CREAM PAIL.—George A. Nash, Niles, Mich.

107,950.—RAILWAY-CAR COUPLING.—Nathan Norris, Buchanan, Mich.

107,951.—APPARATUS FOR DRAWING AND MEASURING OIL.—Person Noyes, Lowell, Mass.

107,952.—TIE FOR BAGS, GRAIN, &c.—George W. Osborn, Parkville, Mich.

107,953.—WIRE.—James S. Parsons, Windham, assignor to himself and Arthur S. Winchester, South Windham, Conn.

107,954.—CULTIVATOR.—Horatio Nelson Pease, Toledo, Ohio.

107,955.—FRICTION ROLLER FOR RAILWAY CAR TRUCKS.—Jethro Pencille, Lockport, N. Y., assignor to himself and Cornelius Hood.

107,956, antedated September 10, 1870.—CURTAIN FIXTURE.—Frederick G. Peoble, New York, N. Y.

107,957.—APPARATUS FOR WASHING ORES AND MINERALS.—Edwin Platt, Charleston, S. C.

107,958.—MACHINE FOR WASHING ORES AND OTHER MINERAL SUBSTANCES.—Jacob B. Platt, Augusta, Ga.

107,959.—WASHING-MACHINE.—Charles M. Powers and Thomas L. Robinson, Flushing, N. Y.

107,960.—TREE AND PLANT-PROTECTOR.—D. R. Prindle, East Bethany, N. Y.

107,961.—HULL OF VESSELS.—Leman P. Rider, Pittsburg, Pa., assignor to himself, William Yagle, and A. Ward, same place.

107,962.—MANUFACTURE OF ICE.—Moritz Rosenstein, Boston, Mass.

107,963.—DEVICE FOR SPREADING CIRCULAR-SAW TEETH.—William H. Rudolph, Clarksville, Tenn.

107,964.—HAND-STAMP.—Henry W. Safford, New York, N. Y.

106,965.—LINK CONNECTING THE HANDLES AND VALVE-RODS OF PUMPS.—Samuel Selden and Matthew Griswold, Erie, Pa.

107,966.—HEAD-BLOCK FOR SAW-MILL.—Franklin W. Shelley, Muncey, Ind.

107,967.—ROOFING.—George Shove, Yarmouth Port, Mass.

107,968.—TEMPORARY PAPER-BINDER.—Fillmore M. Smith, Syracuse, N. Y.

107,969.—READING-GLASS.—J. Hyatt Smith, Brooklyn, E. D., N. Y.

107,970.—ADJUSTABLE TIME-TABLE.—Loyst J. Smith, New York, N. Y., assignor to himself and H. D. Blake, same place.

107,971.—CAR-COUPLING.—Joyst L. Smith, New York, N. Y., assignor to himself and H. D. Blake, same place.

107,972.—CORN-HARVESTER.—Menzo A. Smith, Middlefield, N. Y.

107,973.—PLOW.—Charles W. Snead, Milledgeville, Ga.

107,974, antedated September 24, 1870.—DEVICE FOR ATTACHING STEELS TO CORSETS.—William A. Starrett and Helen E. Statrett, Lawrence, Kansas.

107,975.—GUANO-DISTRIBUTER.—Edwin W. Stedman, Sparta, Ga.

107,976.—CONSTRUCTION OF STEAM-BOILERS AND TANKS.—Henry Julius Stein, Hannibal, Mo.

107,977, antedated September 26, 1770.—STEAM-PUMP.—Charles L. Stevens, Galesburg, Ill., assignor to himself, Albert A. Dentan, and D. G. Dentan,

107,978.—SHAFT-COUPLING.—Timothy F. Taft, Worcester, Mass., assignor to Aurin Wood and Joseph F. Light.

107,979.—MECHANISM FOR OPERATING COMBER-BOARDS.—John Stewart Templeton, Glasgow, Great Britain.

107,080.—GRAIN AND SEED-DRILL.—George M. Thirkittle, Belleville, Mich.

107,981.—MACHINE FOR LASTING SHOES.—Charles H. Trask, Lynn, Mass.

107,982.—DRIER.—Edmund Towbridge and James M. Jones, Detroit, Mich.

107,983, patented in England, March 18, 1868.—LOCOMOTIVE.—James Miller Ure, Glasgow, Great Britain.

107,984.—ROTARY BAKE-OVEN.—Joseph Vale, Beloit, Wis.

107,785.—GRINDER FOR HARVESTER-CUTTER.—Silas O. Vaughn and Phineas W. Vaughn, De Kalb, Ill.

107,986.—THRASHER AND SEPARATOR.—Albert A Walker, Sparta, Wis., assignor to William C. Leyburn, and George A. Fisk, same place.

107,987.—FURNACE-GRATE.—Abner B. Weeks, Rockland, Me.

107,988.—RAILWAY-CAR COUPLING.—George W. Wheat, Philadelphia, Pa.

107,989.—CORRUGATED METALLIC PAVEMENT.—George Wilkes, New York, N. Y.

107,990.—COMBINED HORSE-POWER AND BALING-PRESS.—Charles A. Wright, Rodney, Miss.

107,991.—WASHING-MACHINE.—George Wright, Savannah, Mo.

107,992.—TYPE-PLANER.—Walter Sumner Wright, Chicago, Ill.

107,993, antedated September 24, 1870.—ELECTRO-MAGNETIC SAFE LOCK, Charles O. Yale, New York, N. Y.

107,994.—THRASHING-MACHINE.—Joseph Allonas, Mansfield, Ohio.

107,995.—SPRING-BED.—Lewis Anderson, Chicago, Ill.

107,996.—CLOTHES-RACK.—Herman Baumann and Urban Mueller, Canton, Ohio.

107,997.—COMPOUND FOR COLORING PAPER AND OTHER FABRICS.—Frederick Beck, New York, N. Y.

107,998.—NUT-LOCK.—Jonathan Bell, New York, N. Y.

107,999.—FEATHER-RENOVATOR.—Elias Bickell and Michael F. Noraconk, Milton, Pa.

108,000.—AUXILIARY-TABLE-ATTACHMENT.—James-Blake, Scranton, Pa.

108,001.—RADIATOR.—Edward Bourne, Pittsburg, Pa.

108,002.—SUBSOIL-PULVERIZING ATTACHMENT FOR PLOW.—Luther E. Burdin, Paris, Ky.

108,003, antedated September 30, 1870.—KNITTING-MACHINE.—W. W. Burns and John Nelson, Rockford, Ill.

108,004.—PLOW.—Manlove Butler, Vernon, Ind.

108,005.—APPARATUS FOR CARBURETING AIR AND GAS.—Henry A. Chapin, New York, N. Y.

108,006, antedated September 26, 1870.—LIFE-PRESERVER.—Edward M. Crandall, Marshalltown, Iowa.

108,007.—VEGETABLE-CUTTER.—Francis Curtis, Brattleborough, Vt.

108,008.—CLOTHES-DRIER.—William A. Daggett, Landis township, N. J.

108,009.—GAS RETORT.—Darius Davison, New York, N. Y.

108,010.—CLAPBOARD-GAUGE.—Abram Deyo, Rockford Ill.

108,011.—SAW.—Henry Disston, Philadelphia, Pa.

108,012.—BRICK-MACHINE.—David P. Dobbins and James Sangster, Buffalo, N. Y.

108,013.—MACHINE FOR MILLING CARRIAGE-SPRING HEADS.—William Evans, New Haven, Conn.

108,014.—FLUE.—Nelson Foche, New Orleans, La.

108,015.—MACHINE FOR SCRAPING CHAIR-BACKS.—Erastus S. French, Westminster, Mass.

108,016.—ROTARY ENGINE.—Samuel Gibson, Lancaster, assignor to himself and I. W. G. Wierman, York, Pa.

108,017.—BOLT FOR BARN-DOORS, &c.—Melvin R. Green, Warwick, N. Y.

108,018.—BED-BOTTOM.—Benjamin Gregg, Bennington, Vt.

108,019.—WASHING-MACHINE.—Luke Hale, Hollis, N. H.

108,020.—SEWING-MACHINE.—Thomas J. Harper, Atlanta, Ga.

108,021.—MEAT-MANGLER.—James T. Harvey and William Dixon, Marysville, Pa.

108,022.—REVOLVING FIRE-CRACKER PISTOL.—James H. Hawes and Orville W. Brock, Monroeton, Pa., assignors to James H. Hawes.

108,023.—TRIP-HAMMER AND ANVIL STOCK.—John C. Higgins, Skowhegan, Me.

108,024.—SNAP-HOOK.—Asahel A. Hotchkiss, Sharon, Conn.

108,025.—BEER-FAUCET.—Christian Jakob, New Orleans, La.

108,026.—MOULDING-CUTTER.—Nicholas Jenkins, New York, N. Y.

108,027, antedated September 24, 1870.—PANELING-MACHINE.—Nicholas Jenkins, New York, N. Y.

098,028.—TOY TORPEDO.—Thomas Jefferson Johnson, Cincinnati, Ohio, assignor to H. P. Diehl & Co., same place.

108,029.—GAS-REGULATOR.—Peter Keller, New York, N. Y.

108,030.—COMPOSITION FOR DESTROYING WORMS IN FRUIT TREES.—Solomon Kepner, Pottstown, Pa.

108,031.—GATE.—Solomon Kepner, Pottstown, Pa.

108,032.—PLOW AND PLANTER.—Peter Kling, Springfield, Ill.

108,033.—SEWING-MACHINE.—Albert Komp, New York, N. Y.

108,034.—PUTTING UP MEDICINE.—Frederic Kraus, Cincinnati, Ohio.

108,035.—CHURN.—Alexander Ladd, St. Lawrence, N. Y.

108,036.—HOMINY-MILL.—John K. Leedy, Maurertown, Va.

108,037.—CULTIVATOR.—James R. Little, Galesburg, Ill.

108,038.—ADDRESSING-MACHINE.—James McFatrick, Lena, Ill.

108,039.—BUSTLE.—Donald McInroy, Brooklyn, E. D., N. Y.

108,040.—SAW.—William F. Millman, Philadelphia, Pa., assignor to Henry Disston & Son, same place.

108,041.—ELECTRO-PHOTO DAMASKENING AND ENAMELING.—Arthur Guy Morvan, New York, N. Y.

108,042.—METAL PLATE OF IRON AND STEEL.—James Myers, Jr., Williamsburg, N. Y.

107,043.—CUSHION, MATTRESS, &c.—Thomas H. O'Brien, Providence, R. I.

108,044.—CORN-PLANTER AND MARKER.—Floyd Ogden, Fisherville, Ky., assignor to himself and J. T. Rose, Utica, Ind.

108,045.—MILLSTONE BUSH AND BEARING.—Andrew Ortlip, East Vincent, Pa.

108,046.—SHOW-STAND.—Joseph R. Palmenberg, New York, N. Y.

108,047.—SHOVEL-PLOW.—Peter B. Parcell, Ashmore, Ill.

108,048.—FRUIT-DRIER.—Oliver P. Pence, Des Moines, Iowa.

108,049.—FANNING-MILL.—Christian Peterson, Red Wing, Minn.

108,050.—WATER-HEATER.—James Raisbeck and Thomas A. Raisbeck, New York, N. Y.

108,051.—SEED-PLANTER.—Blachman Asbury Ramsey, Trenton, Tenn.

108,052.—SHUTTER-FASTENER.—Andrew Rankin, Philadelphia, Pa.

108,053.—WHEELBARROW.—Reuben M. Reynolds, East Saginaw, Mich.

108,054.—WASHING-MACHINE.—Albert Riggs, Fortsburg, Md.

108,055.—COMPOSITION AND COVERING FOR STEAM-BOILERS, AND FOR OTHER PURPOSES.—John Riley, Troy, N. Y., assignor to the United States and Foreign Salamander Felting Company.

108,056.—FIELD-ROLLER AND FURROWING MACHINE.—Moses M. Robbins, Centreville, Ind.

108,057.—LAND-ROLLER.—Irving W. Searles, Tiffin, Ohio.

108,058, antedated September 24, 1879.—MANUFACTURE OF IRON AND STEEL.—Lorenzo Siebert, Staunton, Va.

108,059.—SAW.—John Smith, Philadelphia, Pa., assignor to Henry Disston and Hamilton Disston, same place.

108,060.—TANNING-VAT.—John E. Smith and Charles L. Smith, South Dedham, Mass.

108,061.—EARTHEN TEA-POT.—Thomas Smith, Jr., Boston, Mass.

108,062.—SHAFT-COUPLING FOR VEHICLE.—John Steele, Sheldon, Ill.

108,063.—BUTTON-HOOK AND HANDKERCHIEF-HOLDER COMBINED.—George D. Stevens, New York, N. Y.

108,064.—LANTERN.—Peter Sweeney, New York, N. Y.

108,065.—CORN-PLANTER.—Nathan Swigart, Richfield, Ohio.

108,066.—TONGS FOR FORGING THE ARMS OF FIFTH-WHEELS.—Wales Terrell, Ansonia, Conn.

108,067.—METALLIC BINDING FOR TEXTILE FABRICS.—James Twamley, New York, N. Y.

108,068.—TILES FOR ROOFING, &c.—William Utley, Troy, N. Y.

108,069.—HARVESTER.—Ausbert H. Wagner, Chicago, Ill.

108,070.—SAUSAGE-STUFFER.—Henry Wahler, Henry Metz, and Ludwig Heinzel, Freeport, Ill.

108,071.—CAP FOR HORSE-COLLAR.—James F. Walsh, Hazle Green, Wis.

108,072.—RENDERING LEATHER INPERVIOUS TO HYDROCARBON LIQUIDS.—Albin Warth, Stapleton, N. Y.

108,073.—LETTER-BOX.—Edwin Clarence Weld, New York, N. Y., assignor to himself and Theodore C. Glazier, same place.

108,074.—SEWING-MACHINE TABLE.—John J. Wheat, Wheeling, West Va.

108,075.—SECTIONAL STEAM-GENERATOR.—Harry Whittingham, New York, N. Y.

108,076.—HAY-KNIFE.—Daniel H. Wile, New Pittsburg, Ohio.
108,077.—UMBRELLA.—Robert C. Williams, Frankfort, Ky.
108,078.—LAMP-BURNER.—Samuel R. Wilmot, Bridgeport, Conn.
108,079.—JOURNAL-BOX.—Eliza Dexter Murfey, New York, N. Y., assignor to Manhattan Packing Manufacturing Company.
108,080.—JOURNAL BEARING.—Eliza Dexter Murfey, New York, N. Y., assignor to Manhattan Packing Manufacturing Company.
108,081.—JOURNAL-BOX.—Eliza Dexter Murfey, New York, N. Y., assignor to Manhattan Packing Manufacturing Company.

REISSUES.

4,137.—Division A.—DEODORIZING APPARATUS FOR CLOSET.—Earth-Closet Company, Hartford, Conn., assignee of Henry Mould and Henry John Girdlestone.—Patent No. 91,474, dated June 15, 1869.
4,138.—Division B.—EARTH-CLOSET.—Earth-Closet Company, Hartford, Conn, assignee of Henry Moule and Henry John Girdlestone.—Patent No, 91,474, dated June 15, 1869.
4,139—Division A.—HARVESTER.—Rufus Dutton, Yonkers, N. Y.—Patent No. 31 709, dated March 19, 1861; Reissue No. 1,762, dated September 13, 1864.
4,140.—COCK.—Joseph P. Gallagher, St. Louis, Mo.—Patent No. 48 673, dated July 11, 1865.
4,141.—WASHING APPARATUS.—John T. Grose, Upper Sandusky, Ohio, assignor to himself and William E. Kinnear, same place.—Patent No. 98.555, dated January 4, 1870.
4,142.—MACHINE FOR BUNDLING WOOD.—William L. Williams and Thomas J O'Connor, New York, N. Y., assignees of William L. Williams.—Patent No 26.147, dated November 15, 1859.
4,143.—Division A.—POST-OFFICE POST-MARKING AND CANCELING HAND-STAMP.—Marcus P. Norton, Troy, N. Y., assignor to Helen M. Ingalls, same place.—Patent No. 38,175, dated April 14, 1863; reissue No. 1.748, dated August 23, 1864; reissue No. 3,586, dated August 3, 1869.
4,144.—Division B.—HAND CANCELLING STAMP.—Marcus P. Norton, assignor, by mesne assignments, to the "Secombe Manufacturing Company, New York, N. Y.—Patent No. 38,175, dated April 14, 1863; reissue No. 1,748, dated August 23, 1864; reissue No. 3,586, dated August 3, 1869.
4,145.—FRUIT-BASKET.—Lauren Carpenter, St. Joseph, Mich.—Patent No 102,488, dated May 3, 1870.
4,146.—TABLE-LEAF SUPPORTER.—George L. Gerard, New Haven, Conn.—Patent No 106,353, dated August 16, 1870.
4,147.—COAL-HOD.—Edward A. Jeffery, New Haven, Conn.—Patent No. 52,856, dated February 27, 1866.
4,148.—MANUFACTURE OF RUBBER OR GUTTA-PERCHA HOSE.—Edward L. Ferry and Charles Mauheim, New York, N. Y., assignors to Combination Rubber Company and the Gutta-Percha and Rubber Manufacturing Company.—Patent No. 92,353, dated July 6, 1869.

DESIGNS.

4,375.—CLOCK-FRONT.—John A. Bellamy, Charlestown, Mass. assignor to Samuel D. Niles and Benjamin A. Ward, of three-fourths of his right.
4,376.—STOVE-PLATE.—Luther W. Harwood, Troy, N. Y., assignor to Fuller, Warren & Co., same place.
4,377.—IRON RAILING FOR HORSE-STALL.—James L. Jackson, New York, N. Y.
4,378.—IRON RAILING FOR HORSE-STALL.—James L. Jackson, New York, N. Y.
4,379.—IRON RAILING FOR HORSE-STALL.—James L. Jackson, New York, N. Y.
4,380.—LID OF A FEED-CUP IN BIRD-CAGE.—Otto Lindemann, New York, N. Y.
4,381.—MEDALLION OR CAMEO.—Leopold Salomons, London, England, assignor to J. W. Chisholm and K. Chisholm, New York City.
4,382.—SPOON AND FORK-HANDLE.—Bernhard D. Beiderhauser, New York, N. Y.
4,383.—COLLAR-BOX.—Alfred L. Elliot, Boston Mass.
4,384.—BOX FOR HOLDING AND DISPLAYING BRAIDS, TAPES, &C.—Salomon B. Fleisher, Philadelphia, Pa.
4,385.—PLATE FOR PITCHER-STAND.—Hugo O. Fritsch, New York, N. Y.
4,386.—KNITTED FABRIC.—Edward Greasly, Philadelphia, Pa.
4,387.—COFFIN.—Edward T. Smith and Joseph S. Winston, New York, N. Y.
4,388.—DRESS-GOODS.—Matthew Townsend, Canton, Mass.

Natural Ink.

YESTERDAY was one of the dullest of the dull days of all the year for locals. The day was Friday, and Friday here is known to be dull. A local reporter has to be very active on a Friday, if he gets two or three items. He may work and fume and travel round, but his industry will bring him no adequate reward. Yesterday was one of those working days with our reporter; he stuck his head into "Old Block's" office to get an item. It occurred to the reporter that maybe some lucky miner had brought in gold dust to sell, and that a good strike could be chronicled. "Old Block" was calmly writing a letter to some Eastern friend. He said "look at that letter; it is written with ink from a spring, natural ink which bubbled from the ground." We doubted, but "Old Block" assures us he corralled a bottle of natural ink on his late trip to Napa Valley. The natural ink looks black enough on paper to come under the Fifteenth Amendment. California is a producing State. It has inks and acids and oils flowing from the ground. It now needs a great natural distillery which will supply people with the fluid which they consume in great quantities. A reward is hereby offered for a whiskey spring; one which gives the article soft and old, and in never-failing quantities. Nature should produce what man wants, and what he needs. Prospectors should try for the whiskey. Ink is discovered welling up from the ground. Whiskey inspires the use of ink, and compensation should be given the inspiration.—*Glass Valley Union.*

Gunpowder Prepared with Chlorate of Potassa.—M. Zaliwski proposes to render this powder fit for fire-arms, by mixing with it some finely-pulverised oxalic acid. The manufacture of gunpowder wherein, instead of the whole or part of the nitre, chlorate of potassa was introduced was tried in France as far back as the year 1788, at Essone, by the advice of M. Berthollet; but, at the first trial of mixing the materials (sulphur, charcoal, and chlorate of potassa), a tremendous explosion took place, whereby several people were killed. Afterwards (1798), some of this powder was successfully prepared, and tried in fire-arms, but it was found to be dangerous, in consequence of its great tendency to explode, by slight concussion even; and its action is comparable to that of the fulminates, which, as is well known, are not at all suitable to serve as substitutes for powder. The author's idea of rendering chlorate of potassa gunpowder fit for use, by the addition of pulverised oxalic acid, will be further investigated by a committee of scientific men.

A Large Telescope.—Messrs. ALVAN CLARK & Sons, of Cambridgeport, Massachusetts, have contracted to furnish the United States National Observatory with a telescope having an object glass 26 in. in diameter, but the labor involved is so great that it will be four years before the instrument can be completed. At present the largest known to perform satisfactorily in the United States is the one, by the same makers, belonging to the Dearborn Observatory at Chicago. It is 18¼ in. in diameter.

MISCELLANEA.

Improved Snow-Plow.—The *Official Railway News* describes as follows a snow-plow, invented by C. L. HEYWOOD, Superintendent of the Fitchburg (Mass.) Railroad, and used with success on the Vermont and Massachusetts, the New York and Flushing and other roads: "It is a separate vehicle, to run in front of the locomotive, and armed with a plow of prodigious strength, to clear away all snow and ice down to a level with the rails, and this is supplemented with scrapers for clearing the inside and outside edges of the rails down to the spike-heads and chairs. In addition to this, the sides of the car of the plow are furnished with wings that, by means of brakes inside the car, can be set any required angle to the line of rails, and will clear a passage five feet wide on each side of the track. The advantage of this ingenious arrangement is obvious, for, in the event of the plow striking any solid, immovable substance, the wings close automatically, and are re-opened by the plow-tender when the obstacle is passed. The whole work of plowing is so thoroughly done that the shoveling and snow-pricking, generally necessary, and always very expensive, is dispensed with—the track being left as clear as in summer. By the form and construction of this plow, it can be run at any speed, and no depth of snow can withstand its force. It is bound to go through. This machine is all the more valuable because it is calculated to do with a single engine the work which usually requires four or five."

Russian Iron.—The declension of iron manufacture in Russia arises chiefly from deficiency in fuel, and the great distance of the mines from the centres of commerce and civilization. The iron industry in Russia owed its origin to Peter the Great, and one hundred and fifty years ago vast mines were wrought, and great works erected. The Empire seems to produce every description of ore, and each in great variety. In the Altai and the Oural vast masses of magnetic ores are found. There are various other directions where magnetic ore is found in smaller deposits. Very fine ore, for the purpose of steel manufacture, is extracted in several districts. Ordinary ores are much more abundant, and are discovered over a wider area of country. In the centre of Russia, red oxide is the prevailing yield. One great advantage is, that a deep iron mine is not known in Russia; whenever the metal is found it is near the surface. It would be impossible to estimate the resources of this country in iron; probably it exceeds that of any other country in the world.

The Method of Packing the Tea which is sent from Shanghai to San Francisco, and thence over the Pacific Railway, is very peculiar. The tea is placed in small baskets holding one pound each, and three of those baskets are adjusted to the mouths of three others and strapped together. Then fifteen of these parcels of six baskets are made up into a package, and securely covered with matting, and in this style the tea is sent to market. It is asserted that a cargo of teas can be sent from Shanghai or Foo Chow to Chicago in forty-five days. The freights are $3 25 per hundred pounds to San Francisco, thence by the Pacific Railway to Chicago, $1 20, making $7 45 from Shanghai to Chicago. The through freight by rail from San Francisco to New York is $6 per hundred, so that the cost to the Atlantic States is $9 25. The tea, it is asserted, is of a good, strong flavor and perfectly sound. A short time ago, a cargo of 11,000 packages, or 900,000 pounds of tea, was sent to New York by this route, and more recently a cargo of 40,000 pounds was sent to Boston.

The Gosford Wooden Railroad.—The Quebec *Chronicle* contains a report of a trial trip which was made last week, by steam, over the portion of the Quebec and Gosford Railroad on which the wooden rails have already been laid. The report says: "The problem of wooden railways for colonization purposes may now be said to be solved, and as a proof it is only necessary to say that we passed over the road yesterday at the rate of from twenty to thirty miles an hour, a speed which is seldom surpassed on any of the iron roads in the Province." On the return trip to Quebec, under the influence of a little extra steam, the report says, "we were soon 'jogging' along, if we may use the term, at a respectable thirty-five miles an hour. This statement ought to expel any previous impressions existing against the line not being able to run a passenger car at that rate."

National Fire Arms.—The principle of the needle-gun was adopted by Prussia in 1848. Sadowa proved its value, and in the following year France adopted the Chassepot. The following table describes the arms used by different nations, with the size of bore and weight of bullet:

	SYSTEM.	BORE, INCH.	BULLET, OZ.
Prussia	Needle-gun	0 617	1 094
France	Chassepot	0 432	0 980
England	Enfied Snider	0 577	1 097
Austria	Wantzel	0 546	1 056
Italy	Needle-gun	0 691	1 267
Belgium	Albini	0 432	0 180
Holland	Snider	0 495	....
Holland	Snider	0 699	....
United States	Springfield	0 577	1 097

The Great Mont Cenis Tunnel.—During the second half of August the distance pierced upon the Mont Cenis tunnel was 250 ft. 10 in. The distance remaining to be pierced was thus reduced to 1,974 ft., or little more than one-third of a mile. Unless, then, the war should interrupt the progress of the undertaking, there is every prospect of its completion by the end of this year. The distance already pierced is seven miles 1,970 ft.

The French Iron Trade.—As may be expected, the French iron trade has been reduced to a deplorable condition in the Departments of the Haute-Marne and the Moselle. Communications are interrupted, and the whole district is occupied by hostile troops, while enterprise and credit are paralyzed. The change is rendered all the greater by the large measure of prosperity which prevailed before the outbreak of hostilities.

A New Mineral, named "Nadorite," discovered in the province of Constantine, Algeria, has been analysed by M. PISANI. Its chief constituents are the oxydes of lead and of antimony. It also yields a small quantity of chlorine; and this is the chief point of the discovery—for no natural compound was before known in which chlorine was found in the presence of antimony.

BUSINESS AND PERSONAL.

[*Short notices in this column fifty cents per line each insertion.*]

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IMPORTANT TO INVENTORS.

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CHARLES ROGERS, Solicitor and Manager.

In connection with the publication of the ENGINEERING and MINING JOURNAL and the MANUFACTURER AND BUILDER, we have frequently received applications from subscribers and patrons to act as their agents in transacting business with the United States Patent Office; and in view of the increasing number and urgency of such requests, we have resolved to add this department to our business. We have accordingly organized

A COMPLETE PATENT AGENCY,

and now offer our services in procuring pateuts in this and foreign countries, and transacting all business relating to the obtainmg of patents.

Being possessed of superior facilities, in connection with our associate attorneys in Washington and foreign countries, for the successful prosecution of this business, we do not hesitate to guarantee satisfaction to all who may entrust their business to our care.

We have engaged as solicitor and manager MR. CHARLES ROGERS, a well-known expert in this department. Being a practical mechanic, and having been an examiner in the Patent Office at Washington for a number of years, besides enjoying an experience of more than twenty years as a solicitor of patents, Mr. ROGERS is intimately acquainted with all the details of the business, both in and out of the office.

The specifications, drawings, etc., prepared in our office, will be found to compare favorably with those prepared by any other establishment, while the intimate acquaintance of our manager with the routine of business in the Patent Office, gives us a decided advantage in managing difficult cases.

We are fully prepared to prosecute Rejected Cases and Cases in Interference and Infringements, and also to procure Reissues and Extensions of Patents.

We can also furnish Models for use in the Patent Office, to parties who may desire it, as we have made arrangements for this purpose with one of the most skilful machinists in this country, who possesses every facility for getting up models in the most perfect manner, at short notice, and on reasonable terms.

We shall give special attention to the prosecution of Rejected Applications, which have been improperly prepared by the inventor or incompetent attorneys.

We shall be ready at all times to furnish all necessary information and advice to intending applicants, and give our opinion as to the patentability of their inventions, free of charge; and we make it a rule never to take charge of a case unless we see a reasonable probability of obtaining a patent without first giving the inventor our candid opinion as to the probable result of the application.

OUR CHARGES.

Our charges are as moderate as those of any other responsible patent attorneys, as will be seen from the following figures: For preparing a case (whether simple or complicated) and attending to its passage through the Patent Office, our fee is from $30 to $40, which includes all the necessary papers and drawings. If the application is rejected we make no further charge, but prepare all necessary amendments, and, if requisite, appeal to the Board of Examiners-in-Chief. Most Patent Attorneys make an additional charge on each adverse action of the Patent Office, but we have found it more satisfactory to all parties interested to make our full charge at first; and as we expect no contingent fees, it is to our interest to prepare our cases properly at the commencement, thus avoiding annoyance to ourselves and delay in getting out the patent.

The cost of getting out a patent through our agency is—

For first Government fee, stamp, etc	$16
" our fee	$30 to 40
" final Government fee	20
Total	$66 to $76

If the case has to be appealed, the applicant pays the Government fee on appeal, $10; but we shall ordinarily make no additional charge for our services. The first two items are payable when the application is sent in, and the second Government fee when a patent has been allowed. Before an appeal is taken, in any case, the applicant will be fully advised of all facts and charges, and no proceedings had without his sanction; so that all inventors who employ our agency will know in advance what their applications and patents are to cost.

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In advance, on receiving the case	$10
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Total	$30 to $40

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Our fee is	$15
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Total	$25

For attending to the obtaining of Releases, Extensions, etc. and preparing Assignments, our charges vary according to the labor involved.

We are possessed of all the facilities for the successful prosecution of applications for patents in Great Britain, France, Belgium, and other foreign countries, on favorable terms.

Inventors who reside out of New York, and wish to procure a patent, need not go to the expense of visiting this city or Washington, but may send us a model of their invention, or a sketch and brief description; this will enable us to decide as to its probable novelty and patentability, and we can proceed at once to prosecute the case. We shall, however, be glad at all times to see our friends from any section, and give them such information as we are possessed of relating to patents, free of charge. A Post-office order for $16, to pay the first Government fee and stamp duty, should be sent along with the model; our fee $30 to $40, being payable as soon as the application is ready to be sent to Washington.

Patents granted through this agency will be described and illustrated in the columns of the ENGINEERING AND MINING JOURNAL or the MANUFACTURER AND BUILDER, without further charge to the inventor than the cost of the necessary cuts.

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These are made of iron or clay, or both. The principle claimed, among others, is gravitation. If molten metal is poured into the moulds standing vertical, bottle or any other shape, the fine metal will gravitate to the bottom, pressing upwards the corroding acids, phosphorous, sulphur, and all impurities, &c., forming a slag in the neck when cool, giving pure iron or metals of any given shape ready for any purposes, trip hammers or rollers. When steel is made, at the same time dry alkalies, such as potash, &c., or mineral earths, &c., manganese, either or any, are confined at the bottom of the mould to give the required carbon, or coated on the sides of the moulds, the iron ores being smelted with charcoal, peat, &c., to carbonize and malleablize the metal. The metals may be smelted in clay pots, or moulds same shapes, to exclude the air, hole and valve for escape of gases. When the business is large these are suspended on cars by trunnions, about twenty to a car, when the car is moved away to cool and malleablize. When cool the bottom is removed, and the metal drops out and slag knocked off. This course is repeated when very fine metals are required. Ordinary pig iron will be made double value if these moulds are used instead of running them in sand or the open air.

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H. B. WILLSON,
W. E. PARISH,
F. W. KELLOGG,
A. D. PLATT,
P. H. VAN DER WEYDE,
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oct:3t

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8pt. 27:4t JOHN BACHELDER.

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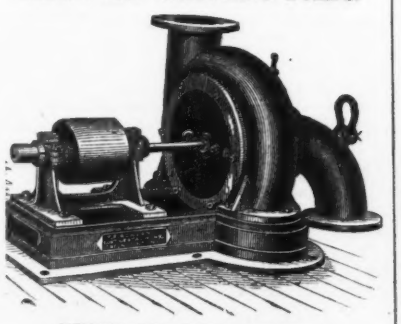

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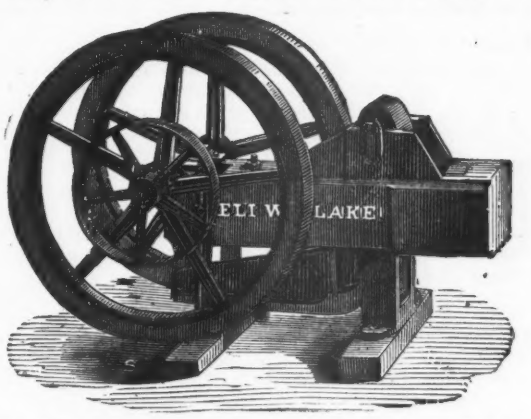

The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

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The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

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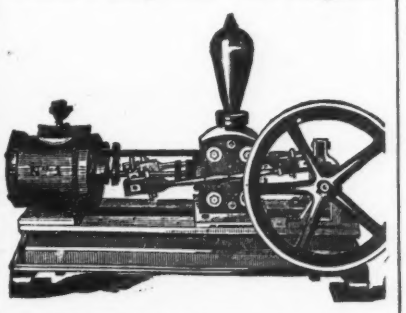

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Air, why it is propelled down, into and around the workings
" Quantity of, produced by the furnace.
" Friction of
" The great friction of produced by one mode of ventilation, and how reduced by another
" Pure added to impure (plans.
" Splitting of (plans)
" One current of (plans)
" One current of, and how to adopt separate currents (plan)
" Dividing of, but not into "separate and and distinct" current (plans)
" Crossings (see H on plans)
" Weight of in shafts
" How to find the weight of
" Table of pressure in shafts
" Expansion of
" Velocity and force
" Rush of, into each division
" Quantity produced by natura ventilation
" Splitting, why it should be adopted
" Splitting, why the workmen object to Mr. Hopton adopting the mode
Anemometer, measurement of air by, engraving of
Area of a pit, how to find
Barometers, Showing the time of an outlet of gas in mines (engraving)
Bricks, how to find the number in the walling of a shaft.
Buddle's plan
Circumference of a pit, how to find
Coal, several ways of working it out, and why man methods of working it out are adopted
" Working out in banks (plans)
" Working it out in following up banks (plan)
" Working out in pillars (plans)
" Working out in long wall (plans)
" Working out in drifts (plans)
" Working out with no regularity (plan)
" Working out by the "end way" or in endings (plan)
Cubical Contents of a pit, how to find
Dialing, the mode of
Dials, several engravings
" How constructed
" How fixed in mine surveying
" Needle, its variations
Diameter of shaft
Dip of mine, how to find and lay on (plan)
Explosion, the power of an
" At Lund-hill, in what part of the mine it was supposed to take place (plan)
" How the power may be diminished
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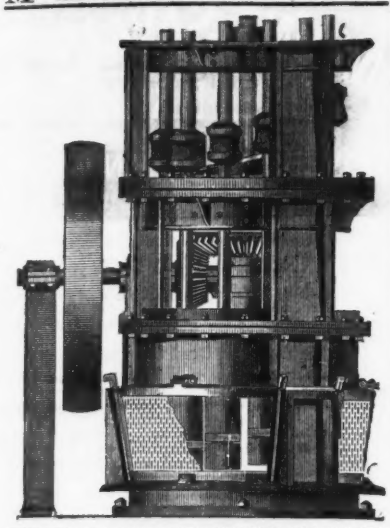

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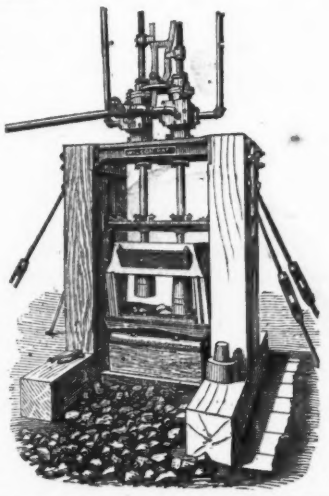

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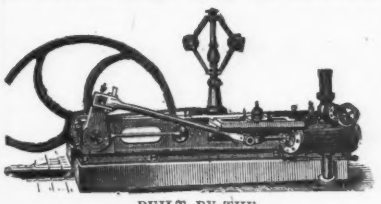

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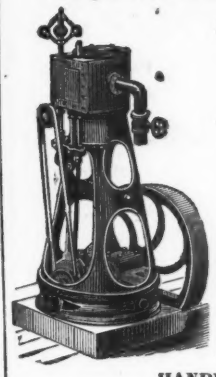

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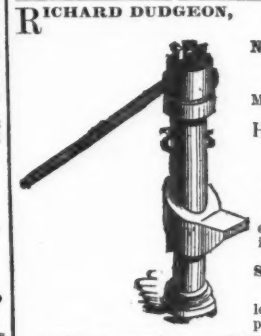

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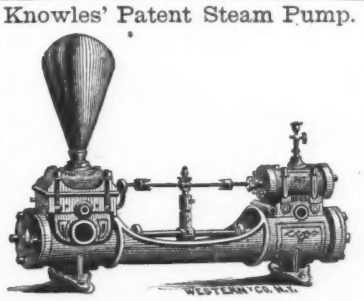

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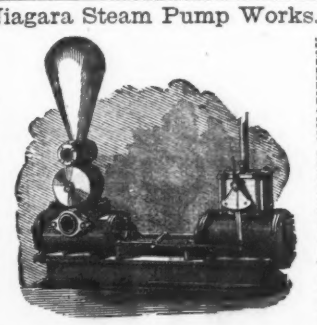

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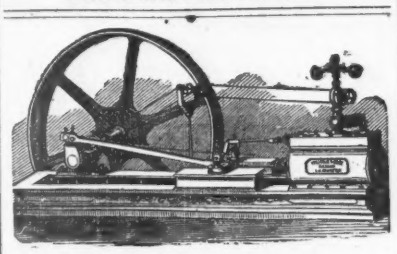

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No. 5. For paving Nineteenth street, from Sixth to Tenth street, with Belgian pavement.

No. 6. For paving Twenty-eighth street, from First avenue to East River, with Belgian pavement.

No. 7. For paving Thirty-eighth street, from Lexington avenue to East River, with Belgian pavement.

No. 8. For paving Forty-sixth street, from Second avenue to East River, with Belgian pavement.

No. 9. For paving Fifty-fifth street, from Eighth avenue to Hudson River (except from Tenth to Eleventh avenues), with Belgian pavement.

No. 10. For paving One Hundred and Nineteenth street from Third avenue to Avenue A, with Belgian pavement.

No. 11. For paving One Hundred and Twenty-seventh street, from Second avenue to Fifth avenue.

No. 12. For paving Cliff street, from John to Frankfort streets, with improved Nicolson pavement.

No. 13. For paving Forty-third street, from Third to Fourth avenues, with improved Nicolson pavement.

No. 14. For paving Forty-fifth street, from Madison to Fifth avenues, with improved Nicolson pavement.

No. 15. For paving Forty-eighth street, from Fifth to Sixth avenues, with improved Nicolson pavement (Robbins' process).

No. 16. For paving Fifty-sixth street, from Seventh to Ninth avenues, with improved Nicolson pavement.

No. 17. For paving Fifty-eighth street, from Third to Lexington avenue, with Nicolson pavement.

No. 18. For paving Fifteenth street, from Seventh to Eighth avenue, with Stafford wooden pavement.

No. 19. For paving Fifty-seventh street, from Lexington to Sixth avenue, with Stafford wooden pavement.

No. 20. For paving Fifty-eighth street, from Sixth to Ninth avenue, with Stafford wooden pavement.

No. 21. For paving Forty-sixth street, from Fourth to Fifth avenue, with Hamar wood-preserved pavement.

No. 22. For paving One Hundred and Twenty-eighth street, from Second to Sixth avenue, with Hamar wood-preserved pavement.

No. 23. For paving Fifth avenue, from One Hundred and Twenty-fourth to One Hundred and Thirtieth streets, with Hamar wood-preserved pavement.

No. 24. For sewer in road or Broadway, between One Hundred and Twenty-ninth and One Hundred and Thirtieth streets.

No. 25. For sewer in Second avenue, One Hundred and Twenty-fifth street and Harlem River, with branches.

No. 26. For sewer in One Hundred and Eleventh street, First to Fourth avenue.

No. 27. For sewer in One Hundred and Fourth street, Third to Fourth avenue, and One Hundred and Fifth street, Second to Third avenue.

No. 28. For sewer in Fourth avenue, Eighty-eighth to Ninetieth streets, with branches, and in Lexington avenue, between Eighty-eighth and Eighty-ninth streets.

No. 29. For sewer in Ninth avenue, from Seventeenth to Eighteenth street.

No. 30. For sewer in Delancey street, from Cannon street to East River

No. 31. For sewer in Laurens street, between Broome and Spring streets, and basins in Lauren street, between Canal and Fourth streets.

No. 32. For sewer in Church street, between Fulton and Morris streets.

No. 33. For sewer in Water street, between Fulton and John streets.

No. 34. For sewer in University place, between Eleventh and Twelfth streets.

No. 35. For sewer in Avenue A, between Seventy-first and Seventy-fourth streets, with a branch in Seventy first streets.

No. 36. For sewer in Eighty-ninth street, between Second and Fourth avenues.

No. 37. For sewer in One Hundred and Thirteenth street, between Third avenue and East River.

No. 38. For sewer in Fourth avenue, between One Hundred and Ninth and One Hundred and Fifeeenth streets, with branches.

No. 39. For sewers between Sixtieth and Sixty-sixth streets, and between Avenue A and Third avenue.

No. 40. For regulating, grading, etc., Eighty-fist street between Second avenue and East River.

No. 41. For regulating, grading, etc., Ninty-sixth street, om Second to Fifth avenue.

No. 42. For regulating, grading, etc., Ninty-sixth street, from Tenth avenue to Hudson River.

No. 43. For regulating, grading, etc., Eighty-first street, from Ninth avenue to the Drive.

No. 44. For regulating, grading, etc., Seventy-fifth street, from Eight to Tenth avenue.

No. 45. For regulating, grading, etc., Sixtieth street, from Public Drive to Hudson River.

No. 46. For regulating, grading, etc., Sixty-sixth street, from Tenth avenue, to the Boulevard.

No. 47. For regulating, grading, etc., Fifth avenue, from One Hundred and Thirtieth to One Hundred and Thirty-eight streets.

No. 48. For regulating, grading, etc., One Hundred and Fifth street, from Third avenue to Harlem River.

No. 49. For regulating, grading, etc., Thirty-fifth street, from Eleventh avenue to Twelfth avenue.

No. 50. For curb, gutter and flag One Hundred and Eighteenth street, from First Avenue to Avenue A.

No. 51. For curb, gutter and flag Eighty-third street, from Third avenue to Fifth avenue.

No. 52. For curb, gutter and flag Forty-fifth street, from Eleventh avenue to Hudson River.

No. 53. For curb, gutter and flag Fifty-first street, from Second avenue to East River.

No. 54. For curb, gutter and flag Seventy-second street, from Second avenue to Third avenue.

No. 55. For curb, gutter and flag Seventy-fourth street, from First avenue to Avenue A.

No. 56. For curb, gutter and flag West street, from Hammond street to Tenth avenue,

No. 57. For curb, gutter and flag First avenue, from Sixty-fifth street to Eighty-sixth street.

No. 58. For flagging Seventy-seventh street, from Third avenue to Fifth avenue.

No. 59. For flagging Seventieth street, from Third to Fourth avenue.

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WILLIAM M. TWEED,
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NEW YORK, Sept. 29, 1870. oct: 2t

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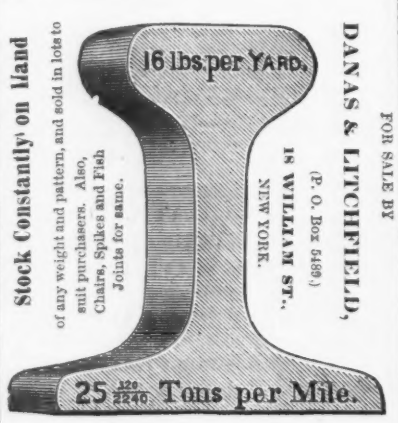
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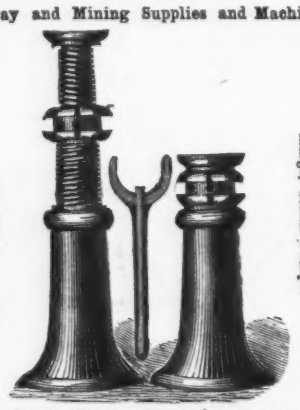

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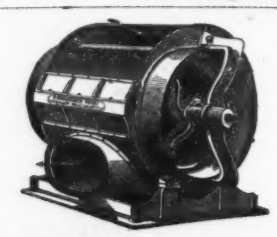

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